**AN ANALYSIS OF CLASS II SUPPLIES REQUISITIONS**

**IN THE KOREAN ARMY'S ORGANIZATIONAL SUPPLY**

THESIS

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AFIT/GLM/ENS/09-04

**DEPARTMENT OF THE AIR FORCE**
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## THESIS

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## Abstract

Timely supply support is critical to sustaining military readiness and operations. In order to improve user satisfaction and to ensure supply support in a timely manner, the supply management paradigm is changing from supplier (supporting unit) focused management to customer (combat unit) focused management.

This research focuses on improvements to the requisition process in Organizational Supply to reduce Customer Wait Time (CWT) in the Korean Army Supply Chain (KASC). The causes leading to requisition problems in seven key areas of Organizational Supply were examined, and seventeen solutions for the problems were suggested. Solutions that can be executed immediately without cost and expert's aid are emphasized. Solutions related to information technology, such as developing a Web based system, were strongly recommended. To reduce requisition processing time in the KASC, the Requisition Management Program was developed and suggested. It can be applied to current requisition tasks, and it would be a useful tool to reduce time and effort to manage requisitions in Organizational Supply.

**Dedication**

My Country, Republic of Korea, and the Korean Army

**Acknowledgments**

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To my classmates, it has been a delight and an opportunity to know and work with you. Best wishes to you all for bliss and success in the future.

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Min Cheol Cho

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# AN ANALYSIS OF CLASS II SUPPLIES REQUISITIONS IN THE KOREAN ARMY'S ORGANIZATIONAL SUPPLY

## I.    Introduction

**Background**

Timely, efficient, and effective supply support to the Korean Army units is critical. The Korean Army is required to have the best possible supply support to maximize its combat power. Military Supply is the process of providing all items needed to equip, maintain, and operate military units. When supply shortages occur to the Korean Army units, it can prevent the units from accomplishing their combat missions. Timely supply support is critical to sustaining military readiness and operations in the current logistics environment. Therefore, providing optimal supply support is crucial to the success of combat missions.

The U.S. Army's Velocity Management (VM) is a good example of a timely supply support effort. VM was started in 1995 and is a U.S. Army initiative to dramatically improve the speed and accuracy of all logistics processes. The VM program initially focused on the order fulfillment process to achieve dramatic improvement in the process to order and receive supplies. The order and receipt process had problems with each segment from requisitioning an item to receipt the package. It was not only slow, but also unreliable. (Edwards and Eden, 1998) In order to eliminate the problems, the VM program was implemented with a three-step method. The first step is defining a process by identifying customers and the requirements of the customers in the process. The second step measures how well a process is being completed. The third step of the

VM program uses the information analyzed in the first two steps to set goals for process improvement. (Solseth, 2004)

Korea Defense Reform 2020 (2006) was established to improve user satisfaction and to ensure supply support in a timely manner. The supply management paradigm is changing from supplier (supporting unit) focused management to customer (combat unit) focused management For customer-focused management new supply performance indicators were created, such as the Customer Wait Time (CWT), which equals the number of days a customer waits to receive an item after a requisition.

According to Choi and Sun (2007), the average CWT for the KASC reached 18.7 days between 2004 and 2005. Detailed problems related to the CWT are addressed in this research. To provide a basic understanding of the KASC, background information will now be presented.

*Five Supply Management Functions*

Supply Management is comprised of five functions: (1) Requisition, (2) Receipt, (3) Issue, (4) Store, and (5) Disposition (or Turn-in), as shown in Figure 1 **Five Supply Management Functions**.

Figure 1 Five Supply Management Functions

Submitting a requisition is the critical task of requesting supplies from the next higher

source of supply. This research focuses on requisition activity in the KASC. A receipt is a

shipment of supplies from the next higher source of supply to a requesting unit. An issue

is giving supplies in a warehouse to a requesting unit, according to the authorization of

the supply manager at the next higher source of supply. Storing involves placing supplies

in a warehouse and the associated inventory management. With regard to inventory types,

all supplies in the KASC are identified on either the ASL (Authorized Stockage List) or

the NSL (Non-authorized Stockage List). The ASL is a list of authorized supplies which

should be stocked at supporting units in order to satisfy customer's requisitions

immediately. The NSL is a list of supplies that cannot be stocked at supporting units.

This is to reduce holding costs. The Disposition/Turn-in function happens when supplies

become unserviceable. The supplies should be disposed of at the unit by using the

supplies or by turning them in to the next higher source of supply. The approval of the

next higher supply manager is required for both disposition and turn-in if the supplies are not consumed.

### *Korean Army Supply Chain (KASC) and Supply Levels*

In addition to suppliers (or manufacturers), there are seven military echelons in the KASC; 1) the Defense Acquisition Program Administration (DAPA), 2) the Army Logistics Command (ALC), 3) the Logistics Supporting Command (LSC), 4) the Divisional Supply Supporting Unit (DSSU), 5) the divisional organization, 6) the non-divisional organization, 7) and the unit. To provide an understanding of the KASC echelons, they will now be described.

1. DAPA was activated on Jan. 1, 2006. It was established to improve defense capabilities through effective management of Armed Force Enhancement Program and Plans, timely delivery of military supplies and better support and promotion of the defense industries. (DAPA, 2006)

2. ALC, the highest supporting unit in the KASC, subordinate to the Korean Army Headquarters, provides supplies from DAPA and is responsible for supply support to LSCs. There is one ALC in the Korean Army. (ALC, 2008)

3. LSC, the second highest supporting unit in the KASC, provides supplies from the ALC and is responsible for supply support to DSSUs and non-divisional organizations. There are four LSCs in the Korean Army. (Wikipedia, 2009)

4. DSSU, the lowest supporting unit in the KASC subordinate to an infantry division, is provided supplies by the LSC and is responsible for supply support to its divisional organizations. There is one DSSU in an infantry division.

5. A divisional organization is a command composed of two or more units. It is subordinate to an infantry division and is provided supplies by the DSSU. It has the responsibility to provide the supplies for its units (e.g. Infantry regiments of an infantry division).

6. A non-divisional organization is a command composed of two or more units and is not subordinate to an infantry division. It is provided supplies by the LSC directly and has the responsibility to provide the supplies for its units (e.g. Artillery Brigade, Engineer Brigade, Army schools or Army College).

7. A unit is any military element whose structure is prescribed by a table of organization and equipment (TOE) and is a part of an organization. A unit is provided supplies by its divisional or non-divisional organization. In the KASC, a unit is the lowest echelon to use supplies and to manage them (e.g. Infantry companies of an infantry regiment or a department of Army College).

The supply levels in the KASC are divided into two types: the wholesale level and the retail level.

At the wholesale level, DAPA purchases supplies from commercial sources or from government plants. The suppliers deliver the supplies which are purchased by DAPA to the warehouses of ALC or LSCs directly. The wholesale supply support is accomplished by distributing the supplies to the retail level. At the retail level, LSCs receive the supplies from the wholesale level and distribute the supplies to the users, such as DSSUs or non-divisional organizations. DSSUs distribute the supplies received from a LSC to the users, such as divisional organizations.

At the retail level, the supply activity of divisional or non-divisional organizations is named Organizational Supply. Organizational Supply involves the supply activities of a requisition, issue, receipt and turn-in between organizations and the next higher supporting unit, and between an organization and its units. This research focuses on the requisition process in Organizational Supply. Figure 2 provides a brief overview of the KASC structure.
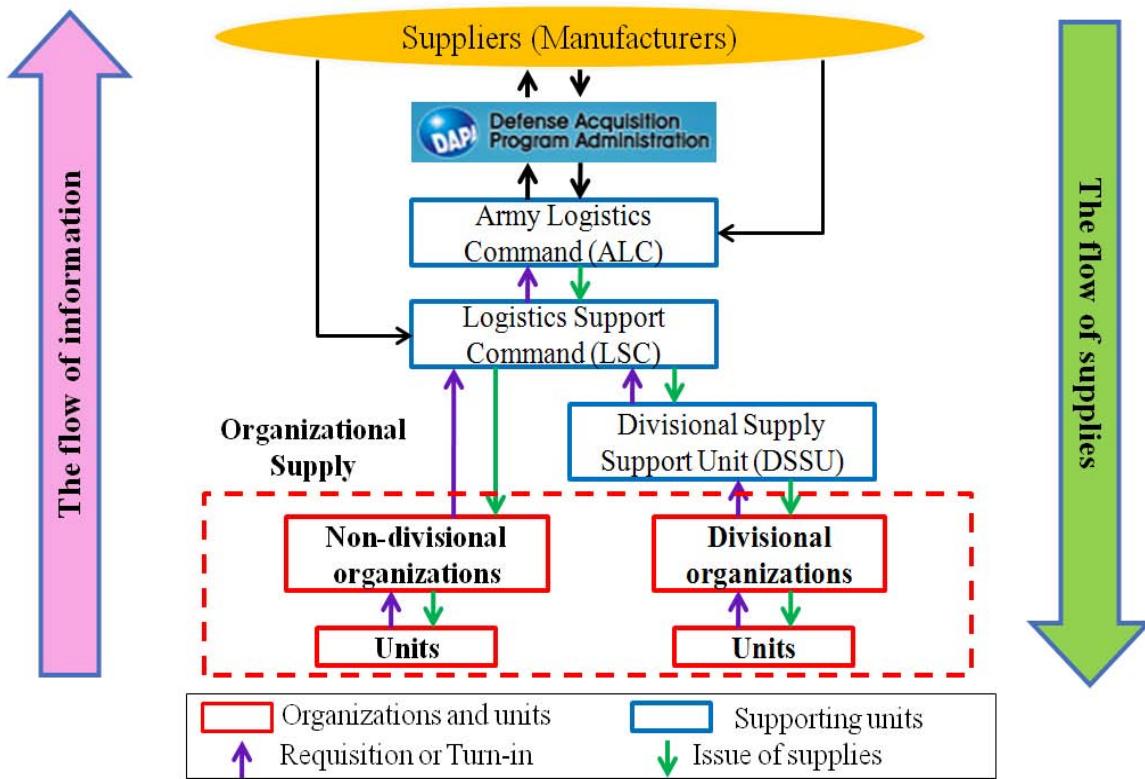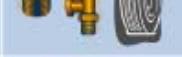


Figure 2 Structure of the KASC

*Classes of the Korean Army Supplies*

The Korean Army has over 700,000 supplies distinguished by National Item Identification Number (NIIN). The supplies are divided into ten major categories, which are referred to as classes. Each supply item is assigned to one of these classes based on its

characteristics and purpose. Supplies in the same class have similar characteristics of usage in nature and inventory management. In addition, the requisition process of each class is a little different. Table 1shows the ten supply classes and what they consist of. (Korea AR, 2007) This research focuses on the Class II Supplies requisition process in Organizational Supply.

Table 1 Classes of Supply items

| CLASS | Description | Examples |
|---|---|---|
| I | Subsistence and commercially bottled water. | |
| II | Clothing, individual equipment, tents, administrative and housekeeping type supplies, as well as unclassified maps. | |
| III | POL includes bulk fuels and packaged products such as antifreeze. | |
| IV | Construction items, including fortification and barrier materiel. | |
| V | Ammunition of all types. | |
| VII | Major end items, such as tanks and vehicles. | |
| VIII | Medical supplies, including repair parts for medical equipment. | |
| IX | Repair parts and components, to include kits, assemblies, and subassemblies, both reparable and non-reparable, which are required for maintenance support of all equipment. | |
| X | Materiel to support nonmilitary programs, such as agricultural and economic development, which are not included in supply classes I through IX. | |

(Adapted from Korea AR, 2007)

### *The Korean Army Supply Systems*

The basic supply system of the Korean Army is a pull system. In the pull system certain supplies needed by units, organizations, or supporting units are provided from the

next higher sources of supply. The supplies are provided by the periodic reports of the retained supplies status at the using units or according to the requisitions initiated by the using units. In the requisition process of the Class II Supplies, an initial supply request is established by a unit and an organization integrates the requests of its units manually. After the accuracy of the requests is confirmed, the supply manager at the organization creates a requisition, including all requests of its units, and transfers the requisition electronically to the next higher supporting unit. According to the requisition, the supply manager at the supporting unit issues the supplies requested by the organization. Therefore, an initial request of a unit is a prerequisite activity for the timely flow of supplies in the Korean Army Supply System. In the case of seasonal, expensive, or infrequently requested supplies, certain supply requirements are automatically delivered or issued for a predetermined period of time without requisition by using units. It is based upon estimated factors or the demand rate in the previous year.

**Problem statement**

As mentioned earlier, the KASC customer-focused supply management is examined in order to improve user satisfaction. For example, the CWT recently measured the number of days a customer waits to receive an item after a requisition. The CWT can be broken down by the times related to the various functions in the KASC as follows.

- The requisition processing time (RPT) is measured from the date an initial requisition is created until the date the requisition is received at the next higher supporting unit.

- The requisition response time (RRT) represents the elapsed time between the reception of the requisition at the next higher supporting unit and the releasing of the requisition by a supply manager.

- The transportation processing time (TPT) is the elapsed time from when the requisition is released by the supply manager to the time the customer receives the supplies requested.

Figure 3 provides an overview of the CWT.
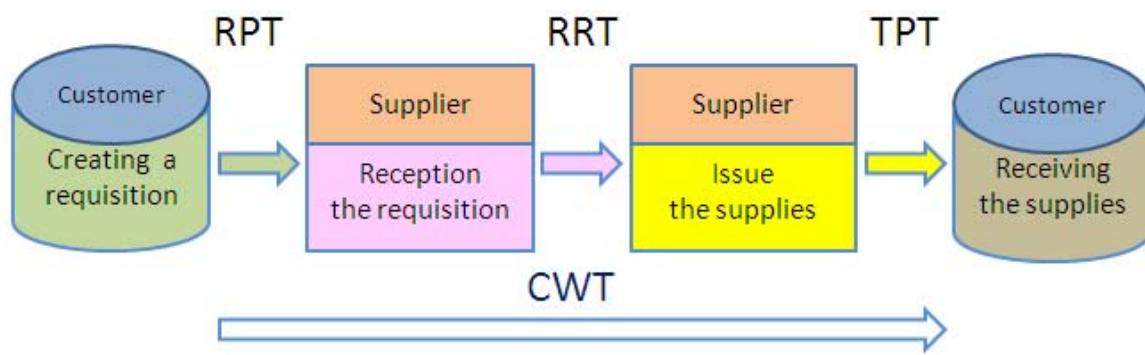


Figure 3 Customer Wait Time components

According to Choi and Sun (2007), the average CWT for Class II Supplies in the KASC reached 25.1 days between 2004 and 2005, as shown in Table 2. More seriously, the standard deviation of the CWT reached 42.9 days. Choi and Sun point out that the average CWT in the KASC is relatively high compared with the U.S. Army's average CWT (19.8 days, in 2000). Considering the current CWT in the KASC, supply support of Class II Supplies is not accomplished in a timely manner. Moreover, the high standard deviation of the CWT shows the wide variability of the supply support time and the reason for customers' serious dissatisfaction.

Table 2 Customer Wait Time in the KASC (2004~2005)

| Supply CLASS | Customer Wait Time (CWT, days) | | |
|---|---|---|---|
| | Average | Medium | Standard deviation |
| I | 16.1 | 8.0 | 26.6 |
| II | 25.1 | 11.0 | 42.9 |
| III | 11.1 | 6.0 | 19.4 |
| IV | 15.0 | 7.0 | 24.9 |
| VIII | 11.9 | 6.0 | 21.9 |
| IX | 32.6 | 4.0 | 64.3 |

(Choi and Sun, 2007)

According to the Korean Army's Logistics Management Report (KALMR, 2006), the average RPT for Class II Supplies in Organizational Supply is over 14 days. However, the average RRT was only one day or less, in case of ASL, and the average TPT was no more than three days. The average RPT of 14 days in Organizational Supply is relatively high value compared to the average CWT of 25.1 days in the KASC, from Choi and Sun's research (2007). Based on this, we can see that the long average CWT is primarily due to the long RPT in Organizational Supply.

In addition to the long RPT, another major problem is the high Requisition Error Rate (RER) in Organizational Supply. RER is one of the major supply performance indicators, and it is computed by dividing the number of Requisition error cases by the total number requisitions received.

$$RER\ (\%) = \frac{number\ of\ requisition\ error\ cases}{total\ requisition\ cases\ (valid\ requisition\ cases\ +\ requisition\ error\ cases)} \times 100$$

According to the Infantry Division's Supply Management analysis report (2008), the RER for Class II Supplies in Organizational Supply reached 16 percent from Jan. 2008 to

Jun. 2008. The high RER in Organizational Supply shows the unit requisitions move slowly and the requisition process in Organizational Supply is not efficient.

The timely flow of supplies is critical to ensure combat readiness and maximize combat power. The speed of delivery is a key indicator for successful supply support to combat units in today's military environment. Due to the long RPT and the high RER, customers' dissatisfaction is high and combat readiness is decreased. Furthermore, due to the tendency of supporting unit focused management in the KASC, research related to the KASC has not adequately delved into the requisition process problems in Organizational Supply.

**Research Objective**

The ultimate purpose of this research is to investigate ways to improve the flow of Class II Supplies to customers and to increase combat readiness by improving the requisition process in Organizational Supply. Due to their great impact, this research will focus on decreasing the RPT and the RER.

**Research Questions**

The overall research questions for this study are;

- What are the causes which lead to requisition problems in Organizational Supply?

- How can the identified requisition problems be fixed or mitigated in Organizational Supply?

**Investigative Questions**

In order to answer the research questions, five investigative questions are addressed.

1.  What is the requisition process in Organizational Supply?

2.  What are the key steps of the requisition process in Organizational Supply?

3.  What are the key areas of influence in the requisition process of Organizational Supply?

4.  With regard to the key areas, what are the causes leading to the requisition problems in Organizational Supply?

5.  With regard to the key areas, what solutions can be applied to the requisition problems in Organizational Supply?

Investigative question 1, 2, and 3 are answered through a review of documentation on the requisition process in Organizational Supply and the order fulfillment process in the Supply Chain Management (SCM) of global business. The other questions are answered through data analysis.

**Research Focus & Theoretical Lens**

Currently the goals of KASC management are to improve customer satisfaction and to increase combat readiness by increasing the speed of supply flow. To contribute to achieving the goals, this research focuses on finding the causes leading to negative effects on the requisition process and the solutions to increase the speed of supply flow in Organizational Supply. For this research, the two basic approaches of "cause and effect" and "problem and solution" are used. Figure 4 shows the theoretical lens for the research.
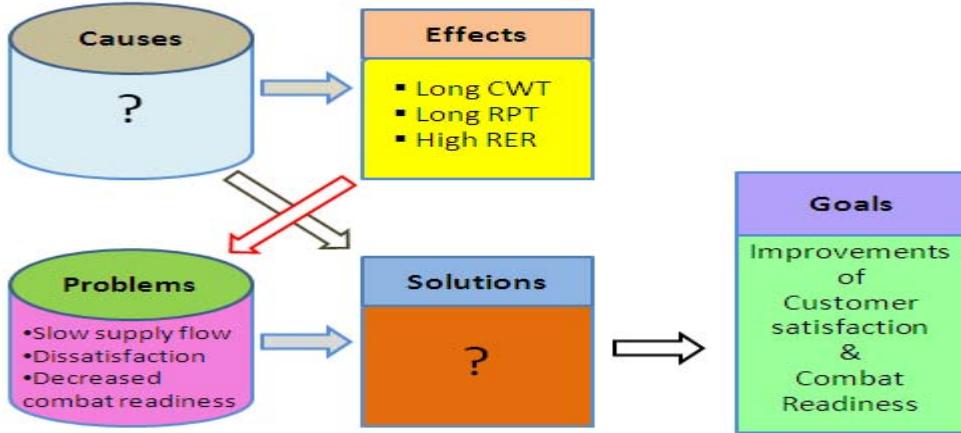
Figure 4 Theoretical Lens for the research

As mentioned previously, the negative effects on the requisition process were already recognized as a long CWT, long RPT, and high RER. From these negative effects, the problems of slow supply flow, increased customer dissatisfaction, and decreased combat readiness in the KASC are created. However, the causes leading to the negative effects on the requisition process have not been known. Therefore, once the causes are identified, solutions for requisition problems can be found. This research will offer detailed solutions.

**Methodology**

In order to achieve the purpose of this research, a case study is chosen as the strategy. There are numerous organizations in the KASC, but all organizations cannot be scrutinized for the research. Thus several organizations are chosen for this research. The organizations can be categorized into two types of organizations as mentioned previously: the divisional organization and the non-divisional organization. Therefore, in order to identify the causes and solutions for requisition problems in Organizational Supply, and to avoid missing information, two levels are used, as follows:

- Level 1: The requisition process of two *divisional organizations*

- Level 2: The requisition process of two *non-divisional organizations*

In order to gather the needed data, interviews with field experts and document reviews are accomplished. The interviews give the researcher a look into the "real" requisition process in Organizational Supply. Interview questions are formulated on the basis of key areas influencing the requisition process in Organizational Supply. The interview questions are both open-ended and closed-ended. The interview questions are in Appendix B. The participants in this study are the Korean Army supply experts at the retail level of the KASC who are responsible for managing Class II Supplies. In order to collect the data needed for a case study, fifteen participants are chosen by their position and unit type, as follows:

- Level 1 Two divisional organizations (nine participants): six participants at the divisional organizations, two participants at the divisions, and one participant at the LSC.

- Level 2 Two non-divisional organizations (six participants): six participants at the non-divisional organizations, and one participant at the same LSC.

The interviews are accomplished by e-mail and phone due to geographic restriction.

Available and relevant documentation is also collected. Documentation comes from the following sources: Korean DoD regulations, Korean Army / U.S. Army regulations, Korean Army Field Manuals (FMs) / U.S. Army FMs, Military publications, journal articles, and other internet resources. To preserve military security policy, all the military information, such as U.S. Army regulations and FMs, are collected through Internet Websites.

In order to answer the overall research questions, seven key areas influencing the requisition process in Organizational Supply are identified. For data collection, sub-questions are formulated on the basis of the seven key areas identified. Qualitative data gathered are arranged in a logical order, according to the seven key areas. The arranged data are categorized into "the causes" and "the solutions" within the seven key areas. Additionally, specific documents and other data are investigated for the specific meanings that they might have in relation to the case. The identified facts from the data collected are synthesized and generalized.

**Assumptions / Limitations**

This research is based on the assumption that all of the data collected from interviewees is reasonably accurate and valid, since they are field experts who have in-depth knowledge of the requisition process in Organizational Supply. This research is limited to Organizational Supply in the KASC. In Organizational Supply, this research is limited to the requisition process of Class II Supplies, because the requisition process of each supply Class is a little different.

**Implications**

Korean Army logisticians are interested in the speed of supply flow in the KASC; however, research about the requisition process in Organizational Supply has not been accomplished. This research is intended to find practical solutions to improve the persistent requisition problems with Class II Supplies in the KASC. The results of this study will be provided to the Korean Army Logistics Department for improving the

requisition process in Organizational Supply. This research has five primary areas of contribution.

- This research is an initiative to delve into the problems with Organizational Supply in the KASC.

- Successful implementation of solutions for the requisition problems in Organizational Supply will speed the flow of supplies in the KASC.

- This research provides a useful framework to solve problems with other Classes of supplies: Class I, Class III, Class IV, Class VIII, and Class IX.

- This research also provides a useful framework to solve the problems of other key processes in the KASC: distribution process, transportation process, inventory management process, turn-in process, etc…

- Finally, this research provides guidance for other military organizations facing similar problems, such as the Korean Air Force and Navy.

**Summary and Preview**

This chapter described the background of the KASC, the requisition problems in Organizational Supply, the aim of this research, investigative questions, and significance of this research. Chapter 2 describes the literature review and provides an understanding of the requisition process in detail and identifies the key areas influencing the requisition process. Chapter 3 explains the methodology used for data collecting and the data analysis procedure. Chapter 4 provides the findings from the data analysis. Finally, Chapter 5 describes the conclusions of this research and recommendations.

## II.     Literature Review

**Overview**

This literature review provides the background of the requisition process in Organizational Supply. The supply management computer programs used in the KASC are also introduced. In order to provide motivation and justification for this research, the significance of the requisition is embodied and the detailed problems with the requisition process are presented, according to relevant literature reviews. This chapter focuses on the Order Fulfillment Process (OFP) and the Order Cycle Time (OCT) in the global SCM to identify the key areas to impact the requisition process in the KASC. The identified key areas are guidance to establish the interview questions to collect data for this research.

**Requisition Process in Organizational Supply**

A requisition in the KASC can be defined as a supported unit's authoritative demand or request for supplies needed to the next higher supporting unit. A requisition flows from units to the next higher supporting unit, as shown in Figure 5.
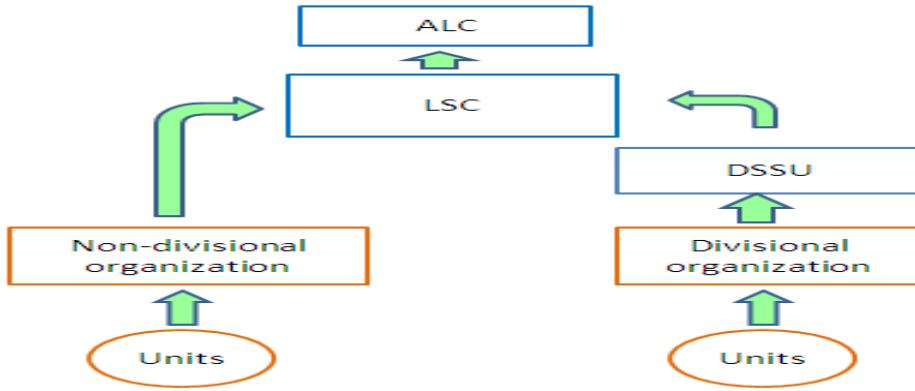
Figure 5 Flow of a requisition in the KASC

### Requisitioning at the Unit Level

At the Unit Level, a Unit Materiel Manager (UMM) is responsible for property accountability. A unit commander is responsible for supervising all supply activity of a unit. The UMM has the responsibility to keep the unit's property in serviceable condition, to record a unit's electronic property book, and to submit a requisition document to an organization unit by hand. The activity to identify the supplies needed at the Unit Level is the Supplies Daily Inspection (SDI). The UMM creates a SDI report weekly and submits the report to an organization unit as a requisition document. Additionally, the UMM can submit a requisition by phone or memo at any time instead of a SDI report. A requisition receipt number is issued to the UMM from the organization unit whenever a SDI report is submitted (Korean AR, 2007). Since the SDI is the most important supply activity of a unit, a detailed explanation of the SDI is addressed in the following section.

### Supplies Daily Inspection (SDI)

According to the Korean AR (2007), the SDI is defined as "the inspection of all supplies designated in a quarter to keep the unit's equipment and materiel in the best

condition. It is the unit's indispensable supply activity for maintaining combat readiness and for calculating a real supply quantity required."

SDI Policy was issued in 1956 and the policy was reformed in 2000. The number of items to be inspected was changed from hundreds of items to 77 items, due to the lack of SDI efficiency. In 2006, the SDI policy was changed again, according to Logistics Materiel Management Improvement Policy (LMMIP, 2006). A detailed SDI process involves planning, execution, and reporting SDI results.

1. Planning

   a. S4 (Supply Officer) or Organizational Supply Sergeant (OSS) at an organization is responsible for establishing the SDI plan of each unit.

   b. SDI items and inspection period are shown in Table 3.

Table 3 SDI items and inspection period

| Classification | Item to be inspected | Inspection Period |
|---|---|---|
| Periodic Inspection Item | Individual equipment and clothes | one time in 4~6 weeks ( in Training Period) |
| Non-periodic Inspection item | all other materiel | one time in a quarter (in Unit Management Period) |

   c. An initial SDI should be planned considering a military training plan, and it can be modified by a weekly training plan.

2. Execution

   a. A unit commander is responsible for execution of the SDI. A squad leader is responsible for inspecting the periodic inspection items and a UMM is responsible for inspecting the non-periodic inspection items.

b. A UMM is responsible for reporting the SDI result of the periodic inspection items to the next higher organization.

c. SDI is performed on duty time or off duty time during work-days.

d. SDI involves the real counting of an inspection item's quantity and differentiating an inspection's condition by condition codes, as follows.

- Code "A" means that the item is a new materiel not yet used

- Code "B" means that the item is a used materiel but in good condition

- Code "C" means that the item is unserviceable but repairable

- Finally, code "D" means that the item is unserviceable and irreparable. The item classified as code "D" should be turned-in to the next higher organization or can be disposed (or consumed) at a unit by approval of its organization commander.

3. Reporting a SDI result

a. A UMM records a SDI result on the Unit Activity Record Book (UARB). The UMM submits a SDI report to the next higher organization weekly and receives a requisition receipt number from the organization. A SDI report form is shown in Table 4.

Table 4 SDI report form

**SDI report (Form 24AR 1 – 05 – 1)**

Unit name:                                              Reporting Date :

| Item name | NIIN | Unit of issue | Project Code | AQ | CRQ | SDI results | | | Treatments | | | Tool code |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | B | C | D | Requisition Quantity | Turn-in Quantity | Consumption Quantity | |
| | | | | | | | | | | | | |

Reporter : Rank, Name, and Signature

- NIIN : National Item Identification Number

- Project Code identifies special projects, programs, certain operations, and/or exercises and maneuvers.

- AQ : Authorized Quantity is the maximum quantity that can be retained

- CRQ : Current Retention Quantity

- Requisition Quantity = AQ – CRQ + code "D" quantity

- Code "D" quantity =  to be turned-in quantity + to be consumed (or disposed) quantity

b.  When an item becomes unserviceable or it requires maintenance unexpectedly, a UMM should include it into the SDI report at any time even though the item is not a planned SDI item.

*Requisition at the Organization Level*

At the Organization Level, a S4 or OSS of an organization is responsible for all property accountability and the supply activity for its units. After receiving a SDI report from a unit, the OSS (or S4) gives a requisition receipt number to the unit's UMM. The

OSS (or S4) compares the CRQ of the unit in the SDI report with the quantity of the unit's property in the Defense Materiel Supply System (DMSS). The DMSS is introduced in the *Supply Management Computer Programs in the KASC* section. The next steps after comparing the quantity are performed as follows.

- If the retention quantity of each item is the same between the SDI report and the quantity in the DMSS, the OSS (or S4) changes the current condition code of the unit's item in the DMSS according to the quantity of each condition code in the SDI report.

- If the code "D" item in the SDI report is the consumable item which can be disposed or consumed at the unit by approval of the organization commander, the OSS (or S4) reduces the quantity reported as code "D" in the DMSS.

- If the code "D" item should be turned-in to the next higher supporting unit, the OSS (or S4) collects the item and turns-in the item to the supporting unit.

The consumption (or disposal) authority depends on the value of the item. The authority is prescribed in the Materiel Supply Directive and Materiel Service Directive.

In case of a requisition by phone or memo from a unit, an OSS (or S4) manually records the requisition of the unit into the Supply Transaction Book and gives a requisition receipt number to the unit's UMM. (Korean AR, 2007)

After comparing and inputting the SDI report of each unit, the OSS (or S4) creates a total requisition of each item in the DMSS. The requisition quantity at the Organization Level is automatically calculated by the DMSS.

In order to provide an understanding about the calculation of a requisition quantity, basic inventory theory and standardized terminologies are now introduced.

According to Tersine (1994), standard inventory theory is the establishment of a local inventory level in terms of which items to stock and then specifying the amount of each item to stock. For each stocked item, the following three quantities are tracked over time. (Tersine, 1994)

- On-hand stock (OH), which is the actual amount of the item in the warehouse.

- Due-in stock (DI), which is the total amount of stock that has been ordered from the next-higher echelon of supply to replenish the on-hand stock plus items due in from repair (as applicable).

- Due-out stock (DO), which is the total amount of unfilled requests resulting, for example, when the local inventory runs out of the item. Due-outs are also referred to as back-orders by customers.

From these three quantities, the inventory position (IP) is calculated. That is, the inventory position equals the on-hand stock, plus the due-in stock, minus the due-out stock.

$$I P = OH + DI - DO$$

At the Organization Level, the IP is named the Asset, which means net assets of an organization. The ASST of an organization cannot exceed the Authorized Quantity (AQ), which is the maximum quantity that can be retained at the organization. Each organization's AQ is calculated on the basis of the TOE and the Standard Book of Material Allowance (SBMA), which prescribes the quantity of supply authorized for each organization and its units. Generally, the total AQ of an organization is equal to the sum of subordinate unit's AQ. The requisition quantity at the Organization Level is formulated as follows.

**Requisition Quantity = AQ – Asset = AQ-(OH+DI-DO)**

The components needed for creating a normal requisition in the DMSS are presented as follows.

- TIC (Transaction Identification Code) is a three digit alphanumeric code that is normally the first entry on all supply transactions. It identifies the type of transaction that is about to be or has already been entered in the DMSS. Examples: 201 – Requisitioning from organization to a next higher supporting unit, 251 – Returning, 294 - Consumption

- NIIN (National Item Identification number) is a 9 digit numeric code. It has two parts. The first part, the National Codification Bureau (NCB) code, is a two-digit number assigned to each country using the NIIN System. NCB code 37 represents South Korea. The second part, the item number, is a seven-digit number serially assigned to each supply item and the first digit in the item number identifies Army (1), Navy (2), and Air Force (3).
  Examples: 37-1-805871: Combat bag of the Korean Army

- BPC (Budget Project Code) is an 8 digit numeric code. It identifies special projects, certain operations with relation to budget types.
  Example: 212-102-08: clothes-special clothes-individual equipment

- OC (Objective Code) is a two digit alphanumeric code. It identifies the special objective of each item.
  Example: 10: General supply item, 21: Item for operating equipment

- UIC (Unit Identification Code) is a ten digit numeric code that uniquely identifies a Unit name.

- DN (Document Number) is a 22 digit numeric code that uniquely identifies each transaction. It consists of a 10 digit UIC, an 8 digit Date created, and a 4 digit serial number.

- UI (Unit of Issue) and UC (Unit of Consumption) is a two digit code.

  Examples: EA: each, BX: box, RO: roll

- CC (Condition Code) is a one digit numeric code that identifies the condition of item.

  Examples: 1: new item, 2: used and serviceable, 8: unserviceable and irreparable item

**Supply Management Computer Programs in the KASC**

In order to manage Class II Supplies, two supply management computer programs are currently used in the KASC. One is the Unit Level Property Book Computerized Managing Program (ULPBCMP) for units and the DMSS for organizations and supporting units. The DMSS is also used in the Korean Navy and Air Force.

At the Unit Level, a property book was maintained manually until 2005. All supply flows were also recorded manually. To improve the units' property management, ULPBCMP was developed in 2006. ULPBCMP is a menu-driven computerized system designed to manage the property of each unit. The primary functions of ULPBCMP are automated property accountability and property book transactions. It allows asset visibility of each item and reduces the time spent to record a unit's property. However, this program cannot perform key supply activity functions like automated requisitioning, document register, and data transferring between the unit and the organization.

Before the DMSS was developed, organizations and each supporting unit used different supply management programs. In 2002, the DMSS was developed to integrate logistics materiel management systems and to standardize the supply management procedures. The primary functions of DMSS are described as follows.

- It facilitates the exchange of information and the accurate data exchanging between organizations and all supporting units through the use of local area networks (LANs).

- It provides time-sensitive functions for organizations and all supporting units: automated ordering, receiving, storing, and issuing.

- It contains specially-designed, on-screen data entry forms that promote accurate entry of manual data.

- It ensures the maintenance of accurate supply records covering all receipts, issues, and storage-related historical transaction data.

- It provides asset visibility of the organizations and all supporting units.

**Significance and Ripple effects of the requisition problem**

The basic supply system of the Korean Army is named the Requisitioning Supply System, which means that the supply flow begins with the requisition. That is to say that there is no supply without a requisition. Therefore, the requisition at below the Organization Level is a key activity in the KASC for the timely flow of supplies. The timely flow of supplies is critical to ensure the combat readiness and maximize the combat power of each unit. Moreover, the speed of delivery is becoming a key indicator for successful logistics performance in today's military environment.

Customer Wait Time (CWT) is a new performance indicator for the speed of delivery measurement and for the KASC effectiveness measurement. CWT simply equals the number of days a customer waits to receive an item after an order is initiated. The overall CWT can be broken down by the times related to the various functions in the KASC. For example, the Requisition Processing Time (RPT) is the time between the date the requisition originates and the date the requisition is entered into the DMSS of the next higher supporting unit. Another timeframe, the Requisition Response Time (RRT) represents the time between the reception of the requisition and the response of the requisition by the supply manager of the next higher supporting unit. The transportation Processing Time (TPT) is measured from the time the requisition is released in the DMSS to the time the requisition is closed out by a customer.

According to Choi and Sun (2007), the average CWT for Class II items in the KASC reached 25.1 days between 2004 and 2005. Choi and Sun also point out that the average CWT in the KASC is relatively high compared with the U.S. Army's average CWT (19.8 days, in 2000). According to a Korean Army's Logistics Management Report (KALMR, 2006), the RPT for Class II Supplies in Organizational Supply is over 14 days. On the other hand, the RRT is only one day or less because the supply manager of the next higher supporting unit confirms the requisition every day using the DMSS, and the TPT for Class II Supplies in Organizational Supply is no more than 3 days. In other words, the overall customer wait time (CWT) is extremely long due to the long RPT in Organizational Supply.

In addition to the long RPT, according to an Infantry Division's Supply Management analysis report (2008), the RER for Class II Supplies in Organizational

Supply is 16 percent from Jan. 2008 to Jun. 2008. The high RER in Organizational

Supply shows the requisition of a unit is not received by the supporting unit quickly and

the requisition process in Organizational Supply is not efficiently accomplished. An

incorrect requisition is returned to the Organization Level, and a S4 or OSS of the

organization corrects the requisition and resubmits it. That means an unnecessary time-

consuming activity occurs in Organizational Supply.

Both the long RPT and the high RER in Organizational Supply play negative

roles in the timely flow of supplies. In addition, the requisition problems create several

ripple effects: the distrust between supported unit and supporting unit, the distortion of

demand, the inefficiency of inventory management, and the inaccurate demand

forecasting. The ripple effects are described in detail as follows.

Due to the long RPT and the high RER, the average CWT reaches 25.1 days in

the KASC, which is over three weeks. That is to say that the end-user waits for at least

three weeks to receive the item needed. Because of the long CWT, the dissatisfaction of

end-users has increased. The logisticians at the Unit Level and the Organization Level

sometimes manipulate the requisition quantity and the item needed to obtain more

supplies at once for future demand. The supply manager at the supporting Unit Level also

suspects the accuracy of the requisition quantity and the item needed, thus the quantity to

be supplied is determined by the supply manager's intuition, not by the real requisition

quantity of the organization.

The major problem with an inaccurate supply quantity is that it distorts the

demand of the organizations. The total demand of the organizations is a very important

factor for the KASC because it effects not only the decision making of each supporting

unit's inventory level, but also the demand forecasting for the procurement of supplies.

For example, the inventory quantity of each supporting unit can be represented with the

authorized Days of Supply (DOS) times the Average Daily Demand (ADD). The

Inventory Quantity of each supporting unit can be shown as DOS * ADD. (Korea AR,

2007)

In addition, demand forecasting in the KASC is based on the total demand of the

organizations for the previous year. Heo (2006) identified the major reason leading to the

inaccuracy of demand forecasting as the inaccurate total demand of the organizations, as

shown in Table 5.

Table 5 Reasons of inaccurate demand forecasting in the KASC

| Echelon | Reasons | Impact of requisition |
|---------|---------|----------------------|
| Organization | - Requisition error<br>- Manipulating Requisition quantity<br>- Incredible SDI report<br>- Tendency to obtain more supplies | Poor managing of requisition<br>⬇<br>Low credibility of demand data<br>⬇<br>Inaccurate demand forecasting<br>⬇<br>Inaccurate acquisition |
| Division / LSC | - Suspecting the requisition of organizations<br>- Manipulating of demand rate in past | |
| ALC | - Low credibility of field demand<br>- Limitation of the demand forecasting Methods | |

(Heo, 2006)

The impact of the requisition problems is increased by the bullwhip effect. The

bullwhip effect means that the distortion of orders is amplified the farther the order is

passed up the supply chain, as shown in Figure 6. The effect is costly because it causes

excessive inventories, unsatisfactory customer service, distortion of demand, and

uncertain production planning (Lee et al., 1997).

Consumer Sales

Retailer's Orders to Wholesaler

Wholesaler's Orders to Manufacturer

Manufacturer's Orders to Supplier
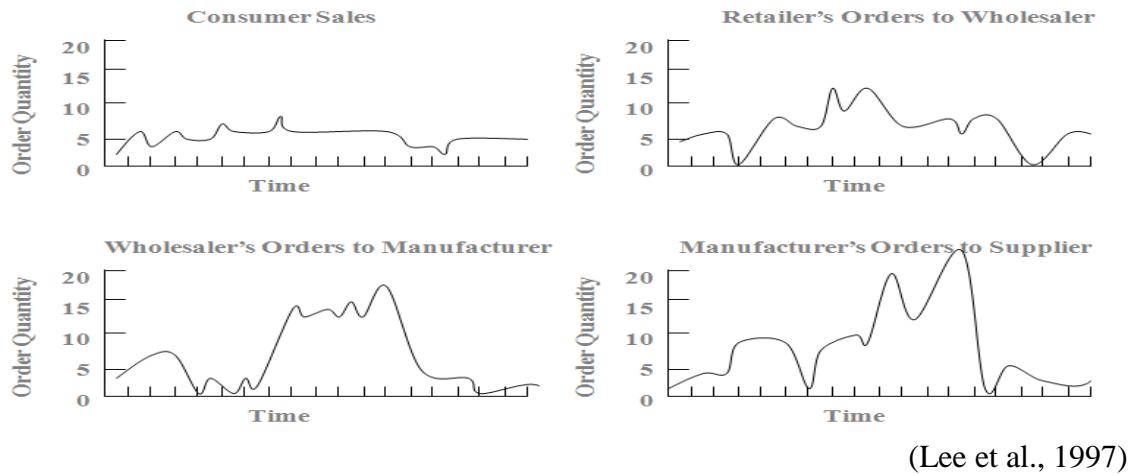
Figure 6 Increasing Variability of Orders up the Supply Chain

The bullwhip phenomenon was first noted by Forrester (1958), and has been observed in many diverse settings. Five major causes of the bullwhip effect are identified by Lee et al. (1997): lead time, demand signal processing, order batching, price fluctuations, and rationing and shortage gaming (flywheel effect). According to Lee et al. (2004), several industry studies, such as efficient consumer response (ECR) and efficient foodservice response (EFR), report the bullwhip effect as most harmful to the efficiency of a supply chain.

Moon (2005) measured the bullwhip effect of 50 items in the Korean Navy Supply Chain by Variance Analysis. Moon identified the fact that the bullwhip effect occurred by increasing lead times which depend on the batch order. There is no significance difference of the bullwhip effect among items and among echelons. In addition, Heo (2006) also found that the bullwhip effect increased lead time in the KASC. He pointed out that the lead time was increased due to longer RPT and the customer waiting time was increased by the lead time. Thus, the logisticians at the Unit Level and the Organization Level have been increasing the requisition quantity unnecessarily to

30

obtain more supplies for future demand. The inventory quantity of each supporting unit

also has been increased to satisfy the requisition of the organizations regardless of real

demand.

**Key areas that impact the requisition process in Organizational Supply**

In this section, the key areas influencing the requisition process in Organizational

Supply are identified. The key areas give direction to identify the causes leading to the

requisition problems and the solutions to mitigate the problems. Based on the key areas,

interview questions are established and the data needed are collected by interviews and

documents. Data analysis also is accomplished in depth by focusing on the key areas.

Research about the requisition process in Organizational Supply has not been

accomplished in the Korean Army. As mentioned earlier, this research is an initiative to

delve into the problems with Organizational Supply. There is no research related to this

research directly, but there are a few relevant studies on order problems in the KASC,

such as the bullwhip effect. The requisition process in the KASC is comparable with the

concept of the OFP in the global business SCM functions. The requisition process in

military SCM is close to the OFP in commercial SCM. Hence, the literature review

approach to identify the key areas focuses on the studies to reduce the bullwhip effect and

the literature related to the OFP. Additionally, in order to obtain information for the

reduction of the RPT, literature about the OCT is reviewed. The findings are summarized

in the end of this section.

Wu and Ktok (2006) investigated the effect of learning and communication on the

bullwhip effect in supply chains. By using the beer distribution game in a controlled

laboratory setting, they tested four behavioral hypotheses – bounded rationality, experiential learning, system learning, and organizational learning – by systematically manipulating training and communication protocols. Order variability decreases significantly in a setting in which participants start with hands-on experience, and are then allowed to formulate team strategies collaboratively. This result indicates that while training may improve individuals' knowledge and understanding of the system, it does not improve supply chain performance unless supply chain partners are allowed to communicate and share this knowledge. Also, the bullwhip effect is, at least in part, caused by insufficient coordination between supply chain partners (Wu and Katok, 2006). The finding from Wu and Ktok's research is that the order process problems are reduced by training, communication, information sharing, and coordination.

Recently, Wright and Yuan (2008) explored the bullwhip effect in the supply chain using simulation analysis to investigate the potential benefit of improved forecasting methods, using Holt's and Brown's methods. In all their simulations, the bullwhip effect was existed. The variability of order volumes increases as one moves up the supply chain from retailer to factory. However, it can be significantly alleviated, by up to 55% overall, by choosing an appropriate ordering policy and forecasting method (Wright and Yuan, 2008). The finding from Wright and Yuan's research is that the order process problems are reduced by choosing a proper ordering policy.

Lambert, Cooper, and Pagh (1998) define Supply Chain Management (SCM) as "The integration of key business processes from end-user through original suppliers that provides products, services, and information that add value for customers and others stakeholders". According to Croxton (2003), the OFP is one of the key processes in

SCM, as shown in Figure 7. The OFP is often seen as the link of different activities that keep the supply chain running. It is the customers' orders that put the supply chain in motion, and the first step in providing customer service is filling them more efficiently and effectively. However, the OFP involves more than just filling orders. This involves more than logistics, and it needs to be implemented cross-functionally and with the coordination of key suppliers and customers (Croxton, 2003).



(Croxton, 2003)
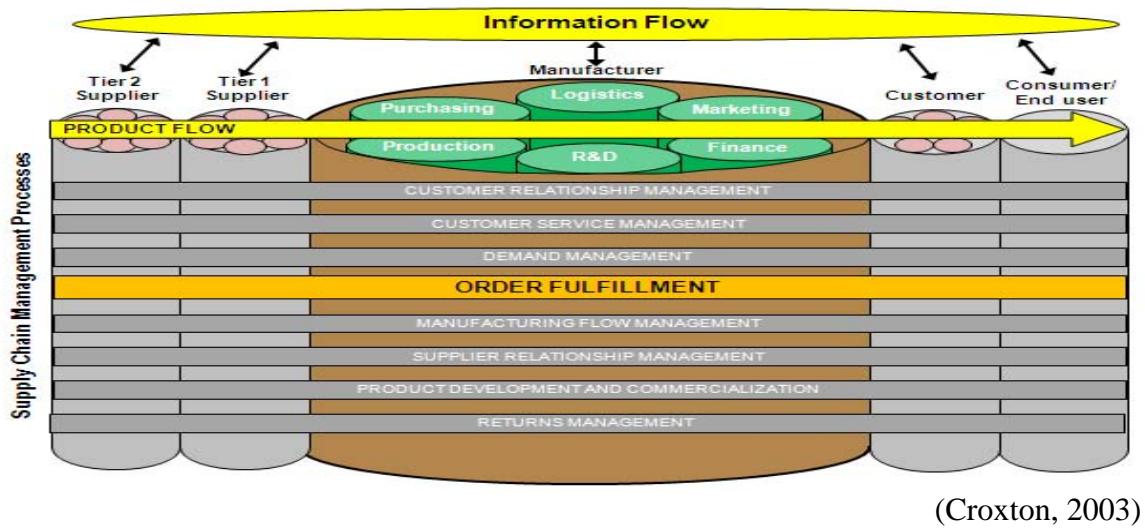
Figure 7 Supply Chain Management Process

Lambert et al. (1998) claim that the primary function of the order process system is to provide a communication network that links customers and suppliers. In addition, they say that the order process system can also provide information for forecasting, logistic information and economic planning. It is important that managers give attention to the people and the procedure that make the technology effective and not rely simply on the technology (Lambert et al., 1998). Kritchanchai et al. (1999) say that the order process is considered an important business process for a firm. The process begins when the customer identifies a need for supplies which then needs to be processed in-house,

before the supplier is informed about the customer's demand. The demand should be managed in the supplier's order system. According to Senthil (2003), the OFP involves a series of communications, design work, document flow, hand-offs, and field work across key stakeholders. The OFP is complex because it consists of several activities, executed by different functional entities, and heavily dependent among the task, recourses, and agents involved in the process.

Croxton (2003) describes the OFP in detail to show how it can be implemented within a company and managed across firms in the supply chain. She divides the OFP into two parts: the strategic process and the operational process. The strategic process includes designing a network, establishing policies and procedures, and determining the role of technology in the process. This requires interfacing and communicating with multiple functional areas within the firm and can be improved by working with suppliers and customers to develop a network and a process that satisfies the customers' requirements in a cost effective manner. The operational process focuses on managing the customer order cycle and the specific activities are executed primarily within the logistics function, as shown in Figure 8 (Croxton, 2003).
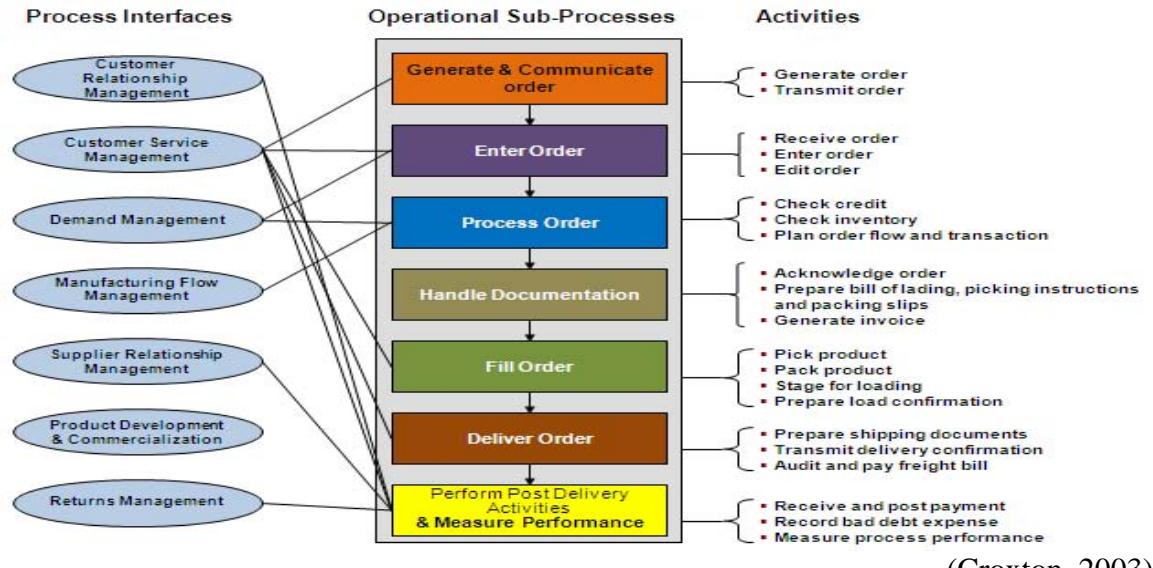
(Croxton, 2003)

Figure 8 Operational Sub-Processes in the OFP

Accenture (1997) identified four key areas to estimate the maturity of the OFP: information sharing, decision making, performance measures, and technology. The areas are differentiated by the relationships between members in a supply chain: transactional, interactive, and interdependent, as shown in Table 6.

Table 6 Four key areas to estimate the maturity of the OFP

| Classification | Transactional | Interactive | Interdependent |
|---|---|---|---|
| Information sharing | Limited to basic order information | Some sharing of inventory availability and shipment information | Extensive sharing of inventory and sell-through information |
| Decision making | Independent order decisions— "phantom demand" | Some negotiation of order decisions among partners | Synchronized ordering decisions driven by shared replenishment policies, channel inventory |
| Performance measures | Limited performance measures | Some shared performance measures like lead-time delivery, and | Extensive use of performance measures tied to shared risk and rewards. |

| | | inventory availability | |
|---|---|---|---|
| Technology | Limited use of technology | Some use of technology to track orders and material flow | Extensive use of technology to allow real-time tracking of orders and material and an automatic replenishment |

<div align="right">(Accenture, 1997)</div>

Dorn (2007) analyzes factors of the OFP in the Swedish Armed Forces (SAF) in order to meet the new demands for developing military capabilities. Several factors to create the OFP problems are identified: the lack of knowledge, the lack of information flow, the lack of proper education and training, and lack of documentation. The main conclusion from the analysis is that in order to improve the OFP in the SAF, it is strongly suggested that the SAF take a much more serious approach to specialized education and training programs in logistics management in the future. Figure 9 shows the problems and the suggested improvements of the OFP in the SAF Supply Chain.
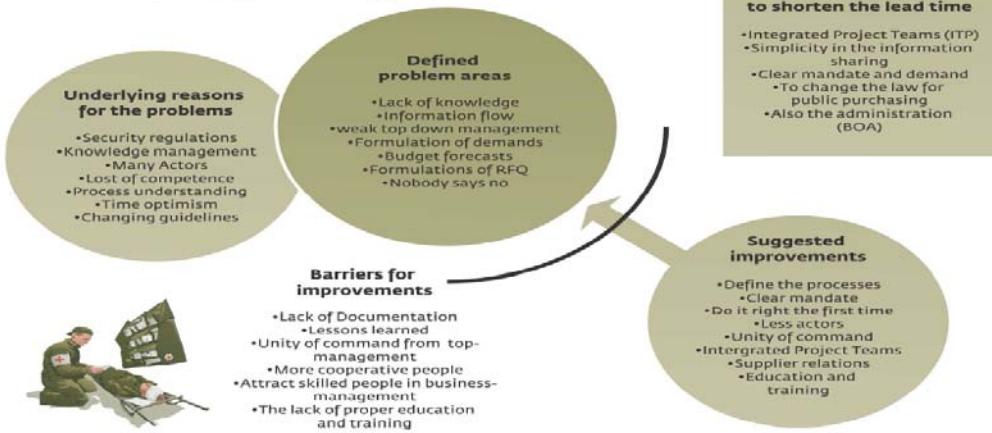


<div align="right">(Dorn, 2007)</div>

Figure 9 Problems and Improvements of the OFP in the SAF

Melan (1989) says that measurement is a key principle to managing processes. Croxton (2003) points out that an important part of the OFP is to measure the process and communicate the results throughout the firm and to key elements of the supply chain. In addition, Schneiderman (1996) says that the single most important improvement a company can make to increase customer satisfaction is by fixing the OFP; therefore it is important to know what and how to measure the OFP.

Harrison (2001) defines OCT as the elapsed time from the receipt of the customer's order to delivery. In order to reduce the OCT, manual steps should be eliminated and these should be replaced with an integrated, automated system which provides speedy information and linked procedures, improving information flows.

Cha (2004) points out the problems with the SDI in Organizational Supply, with regard to the SDI policy. He identified several problems in the planning stage, execution stage, and the way to report of SDI result. Cha suggests five solutions to improve the performance of the SDI as follows.

1. Changing the SDI planning responsibility from the UMM at the Unit Level to S4 or OSS at the Organization Level.

2. Re-classification of the SDI items: common SDI items and specific SDI items.

3. Redesigning inspection time/cycle/inspector.

4. Standardizing the way to report SDI result.

5. Enforcing awards and penalties for the SDI execution.

Finally, KALMR (2006) points out that the major causes for the long CWT are the lack of supply manager's concern and the lack of knowledge. According to Ulrich & Brockbank (2005), human resource is a potentially important yet underutilized source of

competitive advantage for firms. Companies' the most valuable asset is its people

because a SCM is successfully carried out, or fails to be carried out, by people (Darling,

1999:317).

As above, in order to identify the key areas influencing the requisition process in

Organizational Supply, relevant literature was reviewed. The findings of the literature

review are summarized in Table 7.

Table 7 Findings from the literature review

| Researchers | Findings related to the key areas |
|---|---|
| Wright and Yuan (2008) | The order process problems are reduced by choosing a proper **ordering policy**. |
| Dorn (2007) | Several factors to create the OFP problems are identified: the lack of knowledge, the lack of **information flow**, the lack of proper **education and training**, and lack of documentation. To improve the OFP, the specialized **education and training** programs are required for **the logisticians**. |
| KALMR (2006) | The major problems with the CWT are **the lack of persons' concern and the lack of knowledge**. |
| Wu and Ktok (2006) | The order process problems are reduced by **training**, **communication, information sharing, and coordination.** |
| Ulrich & Brockbank (2005) | **Human resource** is a potentially important source of competitive advantage for firms. |
| Cha (2004) | Five solutions to improve the performance of the SDI are suggested, with regard to **the SDI policy.** |
| Croxton (2003) | The OFP is one of the key processes in the supply chain management. The OFP should be implemented cross-functionally and with the **coordination**. The OFP requires **interfacing and communicating** within the firm, and can be improved by **developing a network and a process**. The operational process includes generating and communication order, **performance measurement**, and etc. An important part of the OFP is to **measure the process and communicate** the results throughout the firm and to key elements of the supply chain |
| Senthil (2003) | The OFP involves series of **communications**, document flow, and etc. |
| Harrison (2001) | In order to reduce the OCT, manual steps should be integrated to the **automated system** which provides improved **information flows**. |

| | |
|---|---|
| Darling (1999) | Companies' the most valuable asset is its **people**, because a SCM is successfully carried out, or fails to be carried out, by **people.** |
| Schneiderman (1996) | To increase customer satisfaction by fix the OFP, it is important to know what and how to **measure the OFP**. |
| Kritchanchai et al.(1999) | The demand of a customer should be managed in the supplier's **order system.** |
| Lambert et al. (1998) | The primary function of the order process system is to provide a **communication**. |
| Accenture (1997) | There are four key areas to estimate the maturity of the OFP: **information sharing,** decision making**, performance measures, and technology**. |
| Melan (1989) | The **measurement** is a key principle to managing process. |

On the basis of the findings from the literature review, the seven key areas to influence the requisition process in Organizational Supply are identified as follows.

1. *Information Sharing and Communication*

2. *Computer system and technology*

3. *Personnel (Manpower)*

4. *Education and training*

5. *Logistics Policy (focus on SDI)*

6. *Performance measurement*

7. *Other areas*

The seven key areas are the guidance for identifying the causes leading to the requisition problems and the solutions to mitigate the problems in-depth. Based on the seven key areas, detailed interview questions are established and the data needed are collected by interviews and documents. Data analysis also is accomplished in detail by focusing on the seven key areas.

**Summary**

This chapter provided the basic background about the requisition process in Organizational Supply, including the description of the supply programs currently used in the KASC. Information on the problems with requisitions was explained in detail to provide motivation and justification for this research. On the basis of the relevant literature about OFP in the global business SCM and other relevant literature, the seven key areas to impact the requisition process in Organizational Supply were identified. The next chapter discusses the methodology chosen in this research.

### III.    Methodology

**Overview**

This chapter describes the methodology used in this research. The rationale for choosing an appropriate methodology is provided. First, three basic approaches for general research are introduced and a qualitative methodology is chosen. Second, various qualitative methodologies are presented and a case study methodology is selected to achieve the purpose of this research. Finally, this chapter describes the data collection methods and presents the data analysis procedure.

**Three basic approaches for general research**

According to Creswell (2003), to collect the information for the research, there are broadly three approaches: quantitative research, qualitative research, and mixed research which is the combination of quantitative and qualitative researches. He clearly defines these three approaches as follows.

- Quantitative research is

*One in which the investigator primarily uses postpositivist claims for developing knowledge (i.e. cause and effect thinking, reduction to specific variables and hypotheses and questions, use of measurement and observation, and the test of theories), employs strategies of inquiry such as experiments and surveys, and collects data on predetermined instruments that yield statistical data (Creswell, 2003:18).*

- Qualitative research is

*One in which the inquirer often makes knowledge claims based primarily on constructivist perspectives (i.e. the multiple meanings of individual experiences, meanings socially and historically constructed, with an intent of developing a theory or pattern) or advocacy/participatory perspectives (i.e. political, issue-oriented, collaborative or change oriented) or both (Creswell, 2003:18).*

- Mixed research is

*One in which the researcher tends to base knowledge claims on pragmatic grounds (e.g. consequence-oriented, problem-centered, and pluralistic). It employs strategies of inquiry that involve collecting data either simultaneously or sequentially to best understand research problems. The data collection also involves gathering both*

*numeric information (e.g. on instruments) as well as text information (e.g. interviews) so*

*that the final database represents both quantitative and qualitative information*

*(Creswell, 2003:18-20).*

Table 8 shows well the characteristics of these three approaches and his theory

about research design.

Table 8 Characteristics of Quantitative, Qualitative, and Mixed Methods Approaches

| Categories | Quantitative | Qualitative | | Mixed |
|---|---|---|---|---|
| Knowledge claims | Postpositivist assumptions | Constructivist assumptions | Advocacy/ Participatory assumptions | Pragmatic assumptions |
| Strategy of Inquiry | ▪ Experimental design<br>▪ Quasi-experimental design | Positivism, logical empiricism | Narrative design | Mixed methods design |
| Method | ▪ Predetermined<br>▪ Closed-ended questions<br>▪ Performance, attitude, observation and census data<br>▪ Statistical analysis | ▪ Emerging methods<br>▪ Open-ended questions<br>▪ Field observation, document data<br>▪ Text and image analysis | ▪ Open-ended interview and audiovisual data<br>▪ Text and image analysis | ▪ Both predetermined and emerging methods<br>▪ Both open- and closed -ended questions<br>▪ Multiple forms of data drawing on all possibilities<br>▪ Statistical and text analysis |
| Use these practices of research, as the researcher | ▪ Tests or verifies theories or explanations<br>▪ Identifies variables to study<br>▪ Relates variables in questions or hypotheses<br>▪ Uses standards of validity and reliability<br>▪ Observes and | ▪ Positions himself of herself to collect participant meanings<br>▪ Focuses on a single concept or phenomenon<br>▪ Brings personal values into the study<br>▪ Studies the context or setting of participants<br>▪ Validates the accuracy of findings<br>▪ Makes interpretations of the | | ▪ Collects both quantitative and qualitative data<br>▪ Develops a rationale for mixing<br>▪ Presents visual picture of the procedure in the study<br>▪ Employs the practices of |

| | measures information numerically ▪ Uses unbiased approaches ▪ Employ statistical procedures | data ▪ Creates an agenda for change/reform | both qualitative and quantitative research |

<div align="right">(Creswell, 2003)</div>

A quantitative approach is best for identifying factors that influence outcomes, understanding the best predictors of outcomes, and testing theory or explanation. If the problem is to understand a concept or phenomenon, to understand something where little research has been done, or to understand a problem with an important unknown factor, a qualitative approach is best. If the problem requires both generalization and a detailed view of the meaning of phenomenon, or a concept, a mixed approach is best (Creswell, 2003).

The purpose of this research is to identify the causes leading to the requisition problems in Organizational Supply and to suggest solutions to mitigate the requisition problems. This research is to understand the requisition process upon which little research has been done and to identify unknown causes and solutions for the requisition problems. Therefore, among the three basic approaches, a qualitative research methodology is best for the purpose of this research.

**Qualitative Research Methodology**

Qualitative research can be defined as "any kind of research that produces findings not arrived at by means of statistical procedures or other means of quantification" (Strauss and Corbin, 1990). Qualitative research yields nonnumeric information generated by investigating observable facts that are not easily transformed

into numbers and/or are not quantifiable (Schwandt, 1997). According to Bamberger (2000), qualitative research is commonly more interested in eliciting the behind stories of particular individuals or groups. For example, qualitative methods are appropriate for the analysis and interpretation of the context within which organizations or groups are working and projects are implemented.

The characteristics of qualitative research provided by Merriam (1988) are;

- Focus of research: Quality (nature, essence)

- Philosophical roots: Phenomenology, symbolic interaction

- Associated phrases: Fieldwork, ethnographic, naturalistic, grounded, subjective

- Goal of investigation: Understanding, description, discovery, hypothesis generating

- Design characteristics: Flexible, evolving, emergent

- Sample: Small, non-random, theoretical

- Data collection: Researcher as primary instrument, interviews, observations

- Mode of analysis: Inductive (by researcher), and

- Findings: Comprehensive, holistic, expansive.

According to Bamberger (2000), the strengths of qualitative research are:

- Ability to gain a deeper understanding of what you are evaluating

- Flexibility in evaluation design and implementation

- Relatively inexpensive cost of conducting a study, and

- Greater validity than quantitative studies.

There are many different ways for conducting qualitative research. Leedy and Ormrod (2001) describe five methods for qualitative research: Case study, Ethnography,

Phenomenological study, Grounded theory, and Content analysis. Table 9 provides a

brief overview of the five methods.

Table 9 Five Qualitative Research Methods

| Design | Purpose | Focus | Methods of Data Collection |
|--------|---------|-------|---------------------------|
| **Case Study** | To understand one person/event in depth | One/few case(s) within natural setting | - Observations<br>- Interviews<br>- Written documents |
| **Ethnography** | To understand how behaviors reflect the culture of the group | A specific field site in which people share a common culture | - Participant observation<br>- Interviews<br>-Artifact/document collection |
| **Phenomenological Study** | To understand an experience from the participants' point of view | A particular phenomenon as it is typically lived/ perceived by humans | - In-depth interviews<br>- Purposeful sampling |
| **Grounded Theory Study** | To derive a theory from data collected in a natural setting | Human actions/ interactions, and how they influence one another | - Interviews<br>- Any other relevant data sources |
| **Content Analysis** | To understand specific characteristics of a body of material | Any verbal, visual, or behavioral form of communication | -Identify sampling of material to be studied<br>- Coding of the material |

(Leedy and Ormrod, 2001)

According to Yin (2003), determining a research methodology depends on three

conditions: "the type of research question", "the control an investigator has over actual

behavioral events", and "the focus on contemporary as opposed to historical

phenomena". The case study is a useful strategy to answer "Why" or "How" questions

when the researcher has little or no control over behavioral events, but the research is

focused on current events within some real-life context (Yin, 2003). The overall research questions to be answered through the research efforts are:

- What are the causes which lead to the requisition problems in Organizational Supply? (Why the requisition problems occur in Organizational Supply?)

- How can the requisition problems be solved in Organizational Supply?

In this research, the researcher has no control over behavioral events and focuses on current events within some real military-life context. Therefore, the case study approach was chosen to conduct this research due to the nature of this problem.

**Case study**

More than 25 different definitions of case study have been created in the past three decades. Each definition has its own particular importance and way for research (VanWynsberghe and Khan, 2007). Merriam (1988:9) says the case study is "an examination of a specific phenomenon, such as a program, an event, a process, an institution, or a social group". According to U.S. General Accounting Office (GAO, 1990:17), a case study is "a method for learning about a complex instance, based on a comprehensive understanding of that instance obtained by extensive description and analysis of that instance taken as a whole and in its context." Davey (1991:1) says a case study involves "an in-depth, longitudinal examination of a single instance or event. It is a systematic way of looking at what is happening, collecting data, analyzing information, and reporting the results." Ellram (1996) says that the case study method also typically emphasizes qualitative, in-depth study of one or a small number of cases, and it provides depth and insight in a little known phenomenon. Creswell (2002:485) says that the case

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study is "an in-depth exploration of a bounded system (e.g., an activity, event, process, or individuals) based on extensive data collection." A case study is "an empirical inquiry that investigates a contemporary phenomenon within its real-life context, especially when the boundaries between phenomenon and context are not clearly evident, and in which multiple sources of evidence are used." (Yin, 2003:13).

*Five components for case study*

According to Yin (2003), for case studies, five components of a research design are especially important. The five components are "a study's questions, its propositions, if any, its unit(s) of analysis, the logic linking the data to the propositions, and the criteria for interpreting the findings" (Yin, 2003:21).

The study's questions are prone to be "how" or "why" questions as previously noted. The study's propositions mean the researcher's guess relating to the answer for the research questions. The researcher should formulate a proposition or hypothesis, so that data collection and analysis can be planned to support or disprove the research propositions. The study's propositions occasionally originate from the "how" or "why" questions, and are helpful in focusing the purpose of research. However, not all studies need to have its propositions. For example, an exploratory study would have a stated purpose rather than having propositions, as is the case with this study. The purpose of this research is to investigate ways to improve the flow of Class II Supplies to customers and to increase combat readiness by improving the requisition process in Organizational Supply. The unit of analysis defines the case. It may be an individual person, an event, an organization or a group. The unit of analysis is a key component of case study research design. The unit of analysis of this study is the aspect of a requisition process in

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Organizational Supply. There are numerous organizations in the KASC, but all organizations cannot be scrutinized for the research. Thus several organizations are chosen for the unit of analysis. On the other hand, the organizations can be categorized into two types as mentioned previously: divisional organizations and non-divisional organizations. Therefore, in order to identify the causes and the solutions for the requisition problem in Organizational Supply, two levels are used for the unit analysis as follows.

- Level 1: The requisition process of two *divisional organizations*

- Level 2: The requisition process of two *non-divisional organizations*

Linking the data to propositions and the criteria for interpreting the findings are "the least well developed components in case studies" (Yin, 2003:26). In addition, Yin (2003:27) says, "There is no precise way of setting the criteria for interpreting these types of findings."

Stake (2000) describes three types of case studies: intrinsic, instrumental, and collective. It is an intrinsic case study that focuses on a case which is extraordinary and is of particular significance to the researcher. The primary purpose of an instrumental case study is to provide insight on an issue and the case itself is a secondary concern. The collective case study involves more than one instrumental case (Stake, 2000). A collective case study is known by other names per Merriam (1998) and Yin (2003), such as multiple case studies, cross-case studies, comparative case studies, and contrasting cases.

**Data Collection**

This section provides the information about general data collection methods to choose appropriate methods for this research. In the end of section, the chosen data collection methods are presented in detail.

Yin (2003) says that a case study is not just a data collection method or design features, but a whole strategy. There are three principles for data collection: using multiple sources of evidence, creating a case study database, and maintaining a chain of evidence. Three principles are important to establish the construct validity and reliability. Two major advantages of using multiple data sources are a wide-range of issues and "the development of converging lines of inquiry" that lead to more well-formed conclusions (Yin, 2003:98).

Glesne (1999) and Creswell (1998) say that there are four methods to obtain evidence. These are interviews, observation, document collection, and open-ended surveys. According to Patton (1990:10), "qualitative methods consist of three kinds of data collection: (1) in-depth, open-ended interviews; (2) direct observation; and (3) written documents" All of these sources are used to create a comprehensive description of the participants.

Stake (2000) and Yin (2003) say that there are six primary sources of evidence for case study research. The six sources are: documentation, archival records, interviews, direct observation, participant observation, and physical artifacts. Not all sources are necessary in every case study, but using multiple sources of data for the reliability of the study is important. Using a single source has no complete advantage over the others, so they are complementary. Thus many relevant sources for the research should be used in a

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case study (Yin, 2003). A summary of the strengths and weaknesses of each data collection methods are described in Table 10.

Table 10 Six primary sources of evidence

| Source of Evidence | Strengths | Weaknesses |
|---|---|---|
| **Documentation** | **• stable - repeated review**<br>**• unobtrusive - exist prior to case study**<br>**• exact - names etc.**<br>**• broad coverage - extended time span** | **• retrievability - difficult**<br>**• biased selectivity**<br>**• reporting bias - reflects author bias**<br>**• access - may be blocked** |
| Archival Records | • Same as above<br>• precise and quantitative | • Same as above<br>• privacy might inhibit access |
| **Interviews** | **• targeted - focuses on case study topic**<br>**• insightful - provides perceived causal inferences** | **• bias due to poor questions**<br>**• response bias**<br>**• incomplete recollection**<br>**• reflexivity - interviewee expresses what interviewer wants to hear** |
| Direct Observation | • reality - covers events in real time<br>• contextual - covers event context | • time-consuming<br>• selectivity - might miss facts<br>• reflexivity - observer's presence might cause change<br>• cost - observers need time |
| Participant Observation | • Same as above<br>• insightful into interpersonal behavior | • Same as above<br>• bias due to investigator's actions |
| Physical Artifacts | • insightful into cultural features<br>• insightful into technical operations | • selectivity<br>• availability |

Yin (2003)

In order to gather the needed data for this study, interview and document are chosen from several sources of evidence for case study research. The reasons are that interviews with field experts provide an insight for the causes and solutions of requisition

problems and document reviews provide a broad coverage for the insight. The data collection methods are described in detail as follows.

### *Data collection by Interview*

According to McNamara (1999), interviews are particularly practical for getting the useful data behind a participant's experiences. The interviewer can obtain in-depth information related to the topic. Patton (1990) identifies four different types of interviews as follows.

- *Informal conversational interviews*: This type of interview may happen unexpectedly in the course of field work, and questions are asked in the natural course of conversation; so the wording of questions and the topics are not predetermined.

- *The interview guide approach*: The interviewer has some outline of topics to be covered, but the interviewer can decide the order and wording of questions in the course of the interview.

- *Standardized, open-ended interviews*: The interviewers stick to an exact script, and the wording or order of questions cannot be changed. All interviewees are required to answer for the same basic questions in the same order. Questions are worded in an absolutely open ended format.

- *Closed, quantitative interviews*: Questions and response categories are predetermined, responses are given, and the interviewee chooses from among these given responses.

For the primary data collection, standardized interviews are accomplished. For the standardized interviews, a number of sub-questions for the interviews are formulated on the basis of the identified key areas influencing the requisition process in Organizational Supply. The sub-questions focus on the following investigative questions to be answered.

- With regard to the key areas, what are the causes leading to the requisition problems in Organizational Supply?

- With regard to the key areas, what are the solutions for the requisition problems in Organizational Supply?

The sub-questions are comprised of both open-ended and closed-ended questions. The sub-questions are shown in Appendix B.

The interviews are accomplished with field experts in the KASC. The interviews with the field experts give the researcher a look into the "real" requisition process in Organizational Supply. In detail, the participants in this study are the Korean Army supply experts at the retail level in the KASC who are responsible for managing the Class II Supplies. In order to collect the data needed for a case study, fifteen participants are chosen by their position and unit type as follows.

- Level 1 Two divisional organizations (nine participants): six participants at the divisional organizations, two participants at the divisions, and one participant at the LSC.

- Level 2 Two non-divisional organizations (six participants): six participants at the non-divisional organizations, and one same participant at the LSC of Level 1.

Figure 10 provides a brief understanding of the participants' positions and unit types.
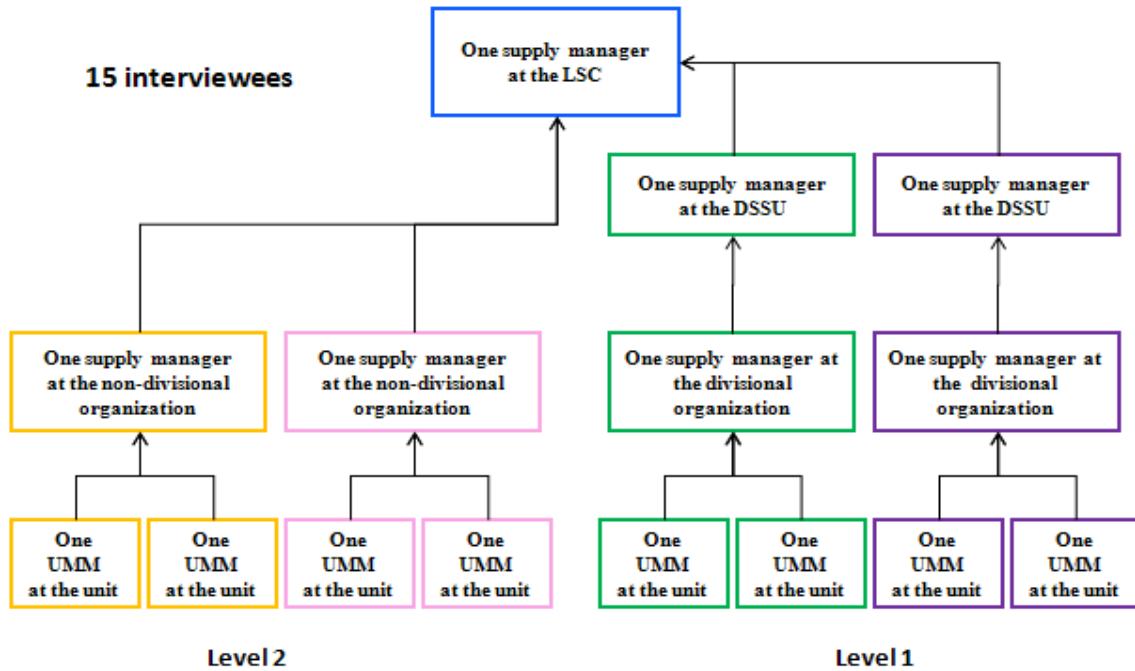
Figure 10 Fifteen participants for interview

The interviews are accomplished by e-mail and phone due to geographic restrictions.

### *Data collection by Document*

For secondary data collection, available and relevant documentation is also collected and reviewed. Documentation comes from following sources: Korean DoD regulations, Korean Army / U.S. Army regulations, Korean Army Field Manuals (FMs) / U.S. Army FMs, Military publications, journal articles, and other internet resources. To preserve military security policy, all the military information such as U.S. Army regulations and FMs are collected through Internet Websites.

## Data Analysis procedure

The data collected from interviews and documents has qualitative characteristics. According to Bogdan and Biklen (1982:145), qualitative data analysis is defined as

"working with data, organizing it, breaking it into manageable units, synthesizing it, searching for patterns, discovering what is important and what is to be learned, and deciding what you will tell others."

The interpretation of qualitative data is likely to be more subjective in nature and it can be influenced by the researcher's biases. Since many data can be created which are both useful and not useful, qualitative data analysis is time-consuming and complex. There is no best technique to analyze qualitative data (Leedy and Ormrod, 2001).

Creswell (1998) describes a five-step process for the analysis of case study data, as follows.

1. Organization of details about the case: The specific facts about the case are arranged in a logical order.

2. Categorization of the data: Categories are identified that help cluster the data in to meaningful groups.

3. Interpretation of single instances: Specific documents, occurrences, and other bits of data are examined for the specific meanings that they might have in relation to the case.

4. Identification of patterns: The data and their interpretations are scrutinized for underlying themes and other patterns that characterize the case more broadly than a single piece of information can.

5. Synthesis and generalization: An overall portrait of the case is constructed. Conclusions are drawn that may have implications beyond the specific case that has been studied.

On the basis of Creswell's five-step process, the data analysis procedure in this research is established as follows.

As previously mentioned, in order to answer the overall research questions, five investigative questions were addressed and three investigative questions were answered in chapter 2. From the answers, the seven key areas influencing the requisition process in Organizational Supply were identified. In order to answer the other two investigative questions mentioned, a case study is used. For the case, two levels of organizations are chosen. One level is two divisional organizations and the other level is two non-divisional organizations. In the case study strategy, the needed data are collected by interviews and documents.

For the data collection, sub-questions are formulated on the basis of the seven key areas identified. The sub-questions are both open-ended and closed-ended question, as shown in Appendix B. Qualitative data gathered are arranged in a logical order according to the seven key areas. Next, the arranged data are categorized into "the causes" and "the solutions" within the seven key areas. Additionally, specific documents and other data are investigated for the specific meanings that they might have in relation to the case. Finally, the identified facts from the data collected are synthesized and generalized. Figure 11 provides a brief understanding about the data analysis procedure.
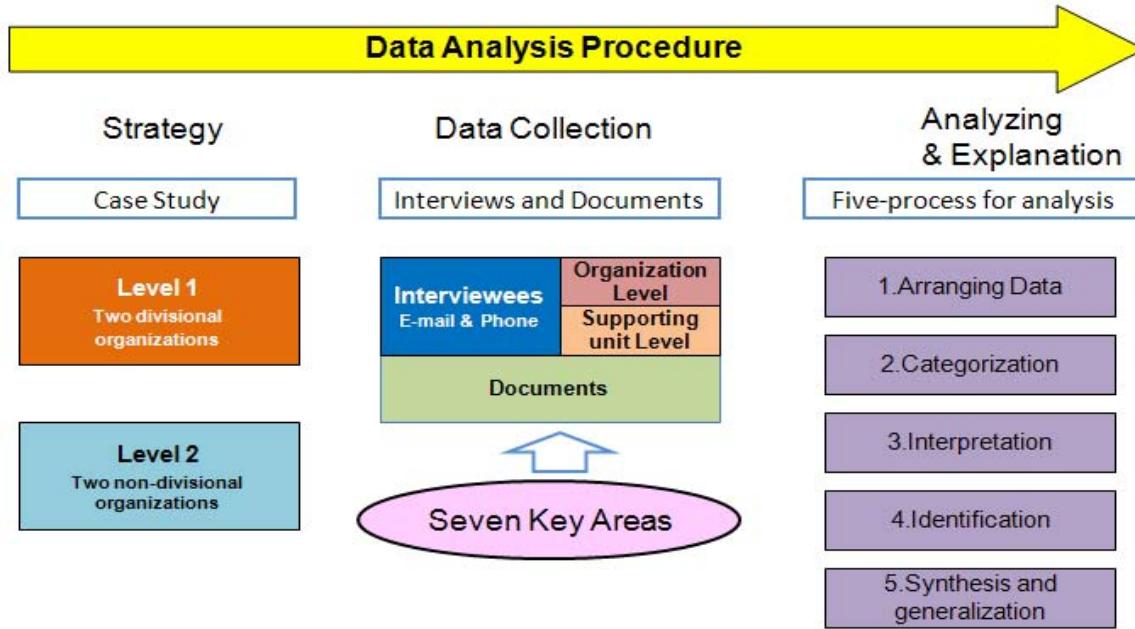
Figure 11 Data Analysis Procedure

**Summary**

This chapter provided the research design and methodology used to answer the research questions. The chapter started with three approaches to research design, provided a justification for selecting the qualitative approach, and described the rationale for selection of a multiple case study. Interviews and documentation were explained as data collection methods, and the theoretical plan for data analysis was introduced. The next chapter describes the findings and the results of the analysis of this research.

## IV. Analysis

**Overview**

This chapter describes the data analysis procedure in detail and the research findings based on the data collected by interviews and relevant documents through a case study. The data analysis procedure section describes the data collection process and the

categorization of data collected in detail for analysis. Next, the research findings describe the causes which lead to requisition problems in Organizational Supply of the KASC, and the solutions which mitigate the requisition problems for the improvement of the requisition process within Organizational Supply in the KASC.

**Data analysis Procedure**

As mentioned earlier, both long RPT and high RER in Organizational Supply prevent the timely flow of supplies in the KASC. Therefore, the research purpose is to improve the requisition process by finding ways to decrease the RPT and the RER. For the research, the overall research questions to be answered are as follows: *(1) "What are the causes leading to the requisition problems in Organizational Supply?" (2) "How can the requisition problems be solved in Organizational Supply?"* In order to answer the research questions, five investigative questions are addressed as follows.

1. What is the requisition process in Organizational Supply?

2. What are the key steps of the requisition process in Organizational Supply?

3. What key areas have influence on the requisition process in Organizational Supply?

4. With regard to the key areas, what are the causes leading to the requisition problems in Organizational Supply?

5. With regard to the key areas, what are the solutions for the requisition problems in Organizational Supply?

Chapter 2 provided answers for the first three investigative questions. The important finding was seven key areas impact the requisition process in Organizational Supply.

- Information Sharing and Communication (ISC)

- Computer System and Technology (CST)

- Personnel (Manpower)

- Education and Training (E&T)

- Logistics Policy (focus on SDI)

- Performance Measurement (PM)

- Other areas

In this chapter, the last two investigative questions are answered by analyzing the data collected. In order to answer the last two investigative questions, a multiple case study methodology was used; one case is the requisition process of two divisional organizations chosen and the other case is the requisition process of two non-divisional organizations chosen. Interviews with field experts at four different organizations and its supporting units were conducted by e-mail and phone, due to geographic limitation. Sub-questions for the interviews were formulated on the basis of the seven key areas identified. The data collected from the interviews are categorized and analyzed according to the seven key areas.

With regard to the data collected from the interviews, the data allowed us to identify the causes leading to the requisition problems in Organizational Supply. However, the data collected from the interviews were not enough to suggest solutions for the requisition problems. Therefore, in order to suggest solutions for the requisition problems, data were collected from relevant document sources: Korean DoD regulations, Korean Army / U.S. Army regulations, Korean Army Field Manuals (FMs) / U.S. Army FMs, Military publications, journal articles, and other internet resources. On the basis of

the data collected from the documents, practical solutions are suggested in order to improve the requisition problems in Organizational Supply.

The research findings focus on the seven key areas. The causes and solutions of the requisition problems in each area are described in detail. This research covers various areas in the requisition process, although the topic of the requisition process was narrowed down from the whole KASC. It is necessary to differentiate the priority of each area in order to determine what area is more important and should be improved promptly. Therefore, the seven key areas were ranked by importance and priority, as shown in Table 11. The seven areas were scored between 1(the least important) and 7 (the most important) by fifteen interviewees. The areas were ranked by total score.

Table 11 Seven areas ranked by importance and priority

| Seven areas | Rank | Sum | Respondents (Fifteen, Score 1 to 7) | |
| --- | --- | --- | --- | --- |
| | | | Organizations | Supporting units |
| Computer system and Technology | 1 | 89 | 69 | 20 |
| Information sharing and Communication | 2 | 83 | 65 | 18 |
| Logistics policy (focusing on SDI) | 3 | 72 | 56 | 16 |
| Performance measurement | 4 | 62 | 50 | 12 |
| Education and Training | 5 | 54 | 45 | 9 |
| Personnel (Manpower) | 6 | 45 | 39 | 6 |
| Other areas | 7 | 15 | 12 | 3 |

The ranked seven areas indicate what area is more important and should be improved quickly from the view of the field experts. The ranked seven key areas are helpful to determine which solution suggested would be executed first to improve the requisition process. In addition, the priority is helpful in selection of the area to be researched in detail, for future research. For this reason, the highest priority area is more extensively studied than other areas.

Figure 12 shows the procedure for the data categorization and the data analysis organization. According to seven areas ranked, exploratory research findings are described in the next section.
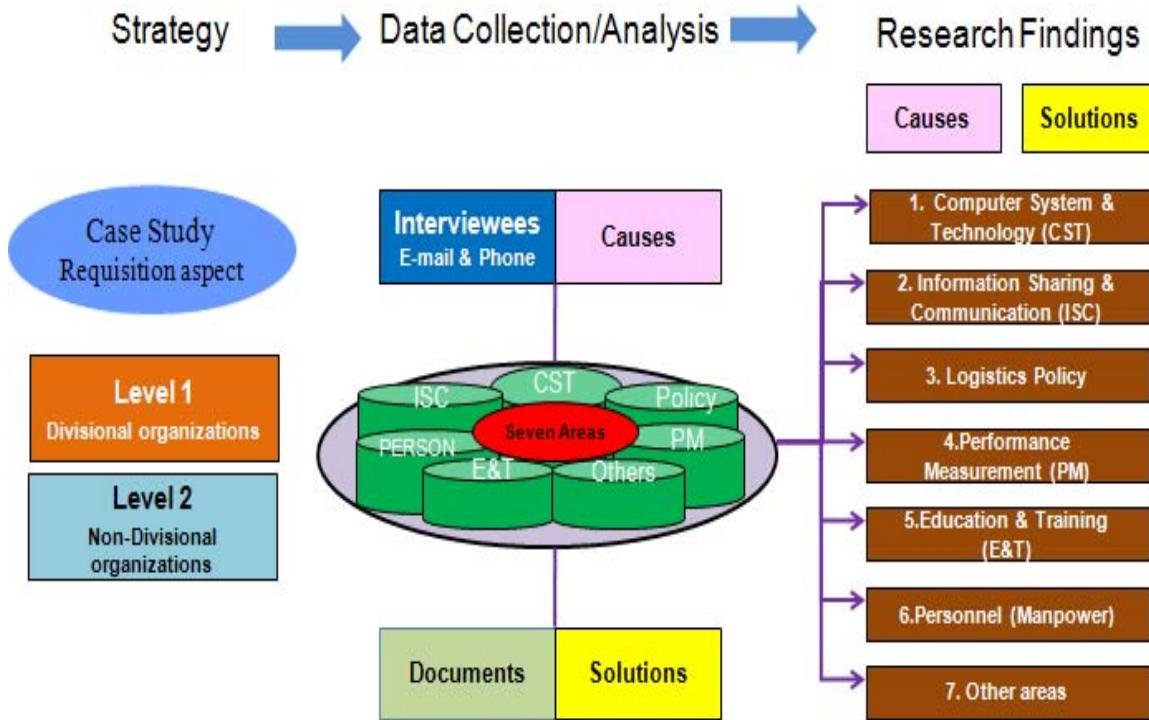


Figure 12 Procedure of data categorization and analysis organization

**Research findings**

This section covers the research findings, which are the reason the requisition process problems happen, and the suggested solutions. The exploratory findings are addressed according to key seven areas ranked by priority and importance. Each sub-section begins with a definition and focus of each area, and then describes the causes for the requisition problems and suggested solutions. In each sub-section, the causes found are explained and summarized in a table, and solutions are also suggested and summarized in a table.

*Area #1 Computer System and Technology*

As previously explained in chapter 2, currently two supply management systems are used in the KASC. One is the Unit Level Property Book Computerized Managing Program (ULPBCMP) for Unit Level, and the other is the Defense Materiel Supply System (DMSS) for Organization Level and all Supporting Unit Level.

The focus of this area involves the function that the current supply programs can perform to automate manual supply works, and what kinds of computer programs and technology are needed to improve the requisition process in Organizational Supply. For that, this section describes three causes for requisition problems, and suggested solutions.

**The causes leading to requisition problems**

*Cause #1 Inefficient ULPBCMP*

The first cause of requisition process problems related to the computer system and technology is that ULPBCMP does not provide an automated function to generate a requisition document and it is not convenient for the user. The ULPBCMP was designed to manage property at the Unit Level effectively. The primary functions of ULPBCMP are property accountability, property transactions and history management. It allows asset visibility of property and reduces the time spent to manage a unit's property. However, this program cannot perform the key supply activity functions such as automated requisitioning, document register, and data transferring between the unit and the organization. ULPBCMP was developed on the basis of MS Access and its Macro function. Although ULPBCMP provides automatic functions for property management, it requires the user to input data needed manually day by day. According to one interviewee at the Organization Level, 7 of 16 users at the Unit Level don't know how to operate it

well. Most of all, they feel ULPBCMP is a complicated program to use. Thus, the limited function and inconvenience of ULPBCMP make the time to create a requisition longer and require much manual work for the user at the Unit Level. It results in longer RPT and higher RER.

*Cause #2 Lack of DMSS Function for Organizational Supply*

The second cause of requisition problems is that DMSS doesn't provide a user-friendly environment with regard to the requisition process, even though it provides a standardized automatic procedure of all of the supply management functions. For example, a supply manager at the Organization Level must manually gather and analyze the Supply Daily Inspection (SDI) reports of the Unit Level whenever he creates a requisition to the next higher Supporting Unit. The requisition quantity at Organization Level is decided by its Units' property consumption or turned-in quantity on SDI reports of the Units, as explained in Chapter 2. The SDI reports are important, but are repetitive and simple tasks. Due to the lack of a DMSS function to do this, the supply manager at the Organization Level must spend much time to accomplish those tasks. In addition, there is no function in DMSS to input the data automatically resulting from the SDI reports analysis. This also requires the supply manager at the Organization Level to expend much time. Thus, the manual process to input data needed in DMSS for requisitions at the Organization Level also leads to longer RPT. On the other hand, the most frequent requisition error at the Organization Level is incorrect input of the BPC (Budget Project Code) and OC (Objective Code) between Organization Level and the Supporting Unit Level inventory. The supply manager at the Organization Level has to select the BPC and OC manually when he completes a new requisition to a next higher

Supporting Unit. There are many types of BPCs and OCs which can be confusing, so those drive the supply manager to create inaccurate requisitions in many cases.

- A BPC (Budget Project Code) is an 8 digit numeric code. It identifies special projects, certain operations with relation to budget types. e.g. 212-102-08: clothes-special clothes-individual equipment

- An OC (Objective Code) is a two digit alphanumeric code. It identifies special objective of each item. e.g. 10: General supply item, 21: Item for operating equipment

*Cause #3 Disconnection of Supply Network*

Finally, the most important cause which creates requisition problems in Organizational Supply is the disconnection of the supply network between the Unit Level and the Organization Level. This cause is also related to the first cause that there is no Computerized Supply System at the Unit Level that provides an interchangeable data transferring function with DMSS. DMSS, developed in 2002, does not provide any function for supply activity at the Unit Level initially. All echelons in the KASC are connected with DMSS on-line except for the Unit Level, due to limitations of the Intranet infrastructure. Having Intranet capability means having an internal computer network that uses Internet technologies to securely share the Korean Army's information. The disconnection of the network between the Unit Level and the Organization Level means that data cannot be transferred in time due to the lack of a data transferring system and Intranet infrastructure. All requisition documents at the Unit Level, such as SDI reports, have been submitted to Organization Level by hand instead of using electronic transfer. Although the Organization Level is connected with DMSS, the delayed requisition

document transferred between the Unit Level and the Organization Level leads to a longer RPT because the requisition process in the KASC begins with the requisition at the Unit Level. Most of the requisition problems are derived from the disconnection of the supply network between the Unit Level and the Organization Level, according to interviews. Table 12 shows the summary of causes related to Area #1 Computer System and Technology.

Table 12 Summary of Causes related to Area #1

| Causes | Summary |
| --- | --- |
| Inefficient ULPBCMP | - Not automated requisition generating function<br>- Not convenient for user to handle<br>- Require manually input data day by day |
| Lack of DMSS function for Organizational Supply | - Not user-friendly environment for requisition process<br>- Required to input quantity data consumed or returned manually<br>- Many selectable input data to create a requisition |
| Disconnection of supply network | - Limitation of Intranet infrastructure<br>- No System providing interchangeable data transferring function |

**Relevant document research for solutions**

One characteristic of interview results is that many field supply experts recognize the causes which lead to requisition problem, but there were no suggested solutions to remove the causes. For example, interviewees suggested solutions like, "Unit Level needs a new system like DMSS" or "DMSS should be operated at the Unit Level". Therefore, the researcher collected the information needed through relevant document reviews, in order to provide more detailed solutions.

The basic approach is to collect information about the U.S. Army supply system, because there are many similarities between the U.S. Army Supply Chain and the Korean

Army Supply Chain. All supply system information related to the U.S. Army, including the Field Manual (FM), was collected from Internet Websites. According to U.S Army FM 10-27-4 (2000), there are three different Unit Level Logistics Systems (ULLSs), ULLS-A for aviation maintenance functions, ULLS-G for unit maintenance functions, and ULLS-S4 for automated supply functions. Among the supply systems used in the U.S. Army, ULLS-S4 provides the supply activity function at the Unit Level. This system automates the following functions:

- Automated supply requisitioning
- Document registers and receipts
- Asset visibility of assigned assets
- Expenditures accounting
- Unit transfers
- Component listings and hand receipts

The same document describes that the Standard Property Book System (SPBS-Redesign) has an interactive on-line property accountability and reporting system operated by the Property Book Officer (PBO). The system can be located at company, battalion, brigade, or division levels. SPBS-R performs the following property accounting functions:

- Property accountability.
- Property book transactions and history.
- Automated document register.
- Property responsibility management (primary hand receipts).
- Unit transfers.

- Change of PBO and hand receipt holder inventory.

- Equipment requisitioning, receipts, turn-ins, and issues.

The Standard Army Retail Supply System (SARSS) is currently used at Retail Level Supply. SARSS is the primary automation system used in the U.S. Army Direct Support (DS)/General Support (GS) supply units. It processes customer requests from ULLSs and SPBS-R. SARSS maintains stock record balances and reports them to the higher echelon SARSS. SARSS provides requisition status (estimated order-ship date, back ordered items, etc.) feedback to its supported ULLS. (U.S. Army FM 10-27-4, 2000)

According to Lockhart (2008), the Property Book Unit Supply Enhanced (PBUSE) is the Army's web-based, state-of-the art, Combat Service Support property accountability system. System features provide Standard Property Book System-Redesign (SPBS-R) and Unit Level Logistics System-S4 (ULLS-S4) functionality. PBUSE is designed to provide the U.S. Army with an integrated automated property accountability information system. PBUSE is used for all the U.S. Army echelons. Logging into PBUSE requires an Army Knowledge Online (AKO, http://www.army.mil/AKO/) user name and password and approval from the information system security officer. PBUSE employs user roles to control access to the various processes and functions in the system and determines the privileges granted within a process (read or write). Users are assigned user roles based on their work locations, such as a property book office or Unit Level, and their positions, such as commander, property book officer, team chief, supply clerk, and so on. (Lockhart, 2008)

Figure 13 shows the initial screen of the AKO website for using the PBUS, internet based website.



Figure 13 U.S. Army Knowledge Online (AKO) Website Initial Screen

There are four characteristics of the U.S. Army supply system obtained by relevant document reviews: (1) a dependent system named ULLS-S4 is used for the supply activity function at the Unit Level, (2) SPBS-Redesign is used for interactive on-line property accountability and reporting system, (3) PBUSE web-based is currently used for the Army supply activity, the system features provides SPBS-R and ULLS-S4 functionality. (4) SARSS is currently used at Retail Level Supply.

**The solutions to improve requisition problems**

*Solution #1 Developing WISS*

The first solution is to develop Web-based Integrated Supply System (WISS) for Unit Level supply activities. As previously mentioned, ULCBCMP, which is the current system at the Unit Level, does not provide a user-friendly environment and the automatic function generating a requisition document. A requisition process at the Unit Level can

be accomplished with other supply activities such as property accountability, receipts registering, and expenditures accounting (return or consumption). Therefore, to generate a requisition automatically, all automated functions of supply activities at the Unit Level should be integrated in the new system to be developed. The key functions related to supply activity at the Unit Level that should be integrated in a New Supply System are listed below. These functions should provide input, correction, searching, displaying, and output (printing/generating) of data.

- Standardized Supply Catalog Management

    (Unit name / UIC, Item name/NIIN, TIC, OC, BPC, DN, UI/UC, etc)

- Property Accountability Management

    (Calculating authorized supply quantity, property transactions, and history)

- Supplies Daily Inspection (SDI) Management

    (SDI result inputting, requisition quantity calculating, and requisition creating)

- Document Register Management (Receipts data inputting)

- Data Transferring Management.

- Total Supply Management for Commander.

- Others (System Manual, help desk, etc)

With regard to the type of new Supply System, a Web-based system is suggested instead of an independent system due to following reasons. Most supply tasks detailed at the Unit Level are accomplished by the supply soldier. The current soldiers are part of the Internet-friendly generation, most supply soldiers are accustomed to using graphical browsers, such as accessing up-to-date documents, using search engines, playing on-line

games, and filling out forms on the World Wide Web. Also, a Web-based system has many benefits for users according to Campbell (2007), as follows.

- Cross-platform compatibility: Web-based applications can be easily designed to work on any system.

- Updates:  Updates are applied to one central location, allowing all users to benefit immediately from the update, without requiring the user to take any action, and without wasting the user's precious time with downloading/installing updates.

- Immediate availability: Do not need to be installed and configured like standard programs. Instead users simply access the online application via web browser, and users are immediately ready to use it.

- Lower minimum system requirements: Web-based applications run on a web server rather than on the user's system. This allows the vast majority of the application's memory/CPU requirements to be handled by the server.

- Fewer Bugs: Web-based applications can be run in a controlled environment (web server), leaving them less prone to crashing, especially due to software or hardware conflicts. Also, everyone uses the same version, so there are no backwards compatibility issues.

- Real time data availability: Web-based applications allow any information that has been input into them to be immediately seen by other users.

- Data availability across locations: Web-based applications allow users to use the same real time data accessible from anywhere.

- Data is safer: Most servers use redundant storage as well as regularly scheduled

  backups, therefore in case of a single hardware failure or user error, it does not

  result in data loss. (Campbell, 2007)

Due to the lack of Intranet infrastructure, the WISS to be developed has the

limitation that not all units are connected with the Organization Level. The WISS will be

operated by a server in Central Data Center (CDC), but users at isolated units cannot

access the CDC. One possibility is that computers at isolated units could be used as a

server for the WISS until Intranet infrastructure is established among all echelons in the

KASC. Having different server locations is a problem with data transferring and

integrating; therefore, to mitigate this problem, additional solutions are provided in the

third solution section.

### *Solution #2 Upgrading DMSS*

The second solution suggested is to upgrade the DMSS function related to the

requisition process at the Organization Level. The input data which is the quantity

consumed or returned from the Unit Level should be entered in DMSS automatically. The

automation of data inputting can be accomplished by adding a SDI report inserting

function in DMSS. This function is strongly related to WISS at the Unit Level. The

electronic SDI report data created by WISS is then inserted into DMSS. To confirm the

accuracy of SDI report data inserted in this process, the supply manager at the

Organization Level can compare initial property of the SDI report data and the DMSS

data. This should be added in DMSS. In order to reduce requisition error at the

Organization Level, BPC and OC should be in accordance between the Organization

Level and the Supporting Unit Level. Most of all, BPC and OC should be selected

automatically, on the basis of item information, when the supply manager at the

Organization Level creates a new requisition to a next higher Supporting Unit.

*Solution #3 Reducing Data Transferring Time*

The third solution is to reduce the data transferring time between the Unit Level

and the Organization Level. The reasons of disconnection between the Unit Level and the

Organization Level were the lack of data transferring system and Intranet infrastructure.

As previously mentioned, the first suggested solution is to develop the WISS for users at

the Unit Level, and the second solution is to upgrade the DMSS for users at the

Organization Level. However, these solutions do not relate directly to the connection

between the Unit Level (WISS) and the Organization Level (DMSS). The previous two

solutions are preliminary tools to connect the Unit Level and the Organization Level to

minimize the data transferring time. Therefore, an additional solution to minimize the

data transferring time is provided with the following two approaches. One is that data can

be effectively transferred between WISS and DMSS with an on-line network. Data

transferring time can also be minimized between isolated units and organizations with an

off-line network.

Although WISS will be developed in future and assuming that Intranet

infrastructure is established among all echelons in the KASC, WISS and DMSS are

totally different systems. This means that it is necessary to find a way of consolidating

WISS data in DMSS functionally. With regard to the requisition process, the data needed

from WISS is an electronic standardized SDI report. To transfer this data in DMSS in

time, the suggested way is to use the current Electronic Bulletin Board (EBB) for supply

activities that allows users to leave messages and access information of general interest at

the Organization Level or other next higher supporting units. The thorough procedure is; (1) Input a SDI result into WISS, (2) Generate an electronic SDI report to transfer, (3) Leave an electronic SDI report on EBB, and (4) Insert a SDI report in DMSS automatically. Using EBB to transfer a SDI report is expected to effectively reduce RPT, versus submitting a SDI report by hand to the Organization Level. All other relevant data such as standardized supply catalogs also can be transferred the same way.

As previously mentioned in the first solution section, users at isolated Unit Levels cannot access EBB for data transferring due to lack of Intranet infrastructure. Therefore, an alternative way to transfer the data is to use an authorized portable storage device, such as 3.5" Floppy Diskettes or USB (Universal Serial Bus) Flash Drives. In order to minimize the data transferring time, users at isolated Unit Levels should use the nearest unit which is connected with the Intranet. The thorough procedure is; (1) Input a SDI result into WISS, (2) Generate an electronic SDI report to transfer, (3) Deliver an electronic SDI report directly to a next higher Organization Level by using portable storage (or Leave an electronic SDI report on EBB by using nearest Unit connected with Intranet), and (4) Insert a SDI report in DMSS automatically.

*Solution #4 Requisition Management Program for Organization Level (REMPO)*

Developing the WISS and upgrading the DMSS require time, cost, and experts' aids. According to interviewees, users at Organization Level and Unit Level have been expended much time on manual tasks to create SDI reports, integrate SDI reports, and check the accuracy of SDI reports. In addition, the interviewees say that the manual tasks should be automated in order to reduce the RPT as soon as possible. Therefore, the fourth suggested solution is to use the Requisition Management Program for the Organization

Levels (REMPO). REMPO was developed by the researcher using Microsoft's Excel

2007® Visual Basic Application (VBA). In order to develop REMPO, the researcher

focused on the manual tasks which require much time, such as integrating SDI reports,

feedbacks for requisitions, and SDI reports/Feedbacks data management. The key

functions of REMPO are to merge the SDI reports in a few seconds, to create feedbacks

for requisitions, and to manage SDI reports /Feedbacks Data. In order to merge SDI

reports at once the SDI report form was standardized by using a MS Excel file format.

The thorough procedure is; (1) Input a SDI report into the standardized Excel form

(SDIreport.xls) at the Unit Level, (2) Rename "SDIreport.xls" to "SDIreport & unit

name&date" at the Unit Level, e.g. "SDIreport1stcompany20090326.xls", (3) Leave the

file on the local EBB (Leave the file on the EBB of the nearest unit connected with

Intranet if none available local) or deliver the file to the next higher Organization Level

using portable storage device, (4) Merge files and feedback for each requisition at the

Organization Level, and (5) Print SDI feedback and make a requisition at the

Organization Level using DMSS. Figure 14 shows the major functions and screens of

REMPO. The coding of REMPO is presented in Appendix 3.
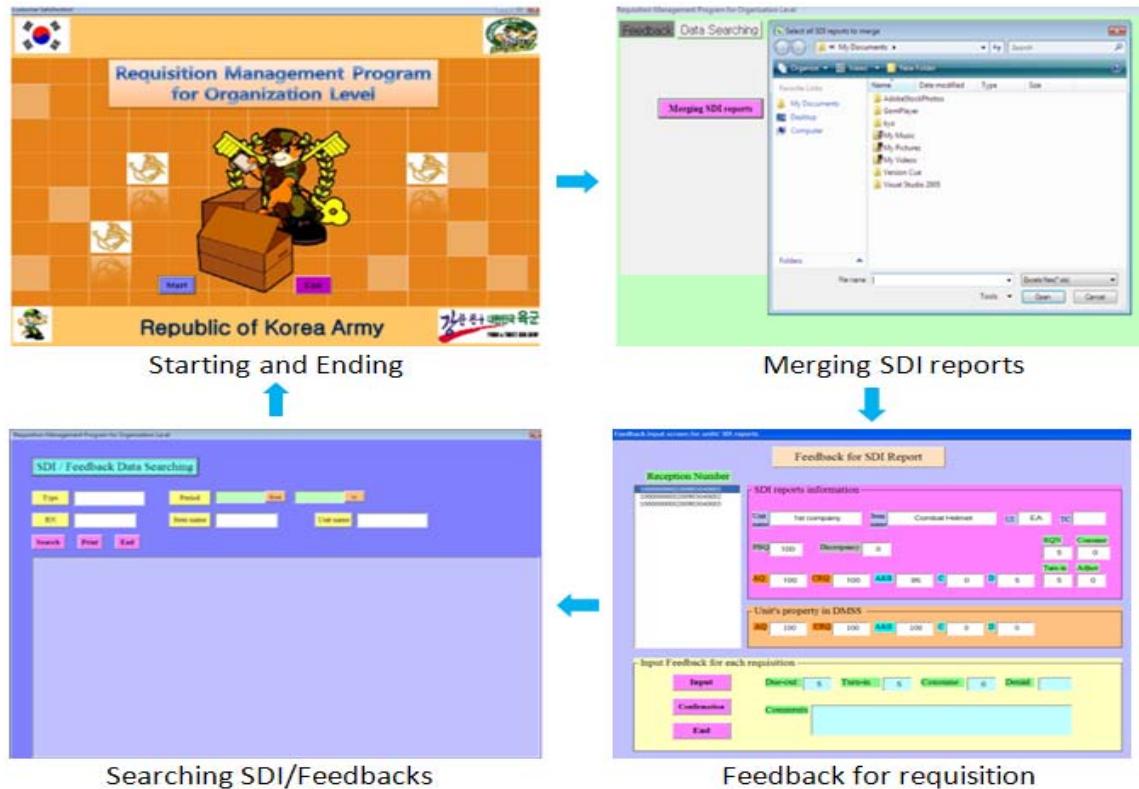
Figure 14 Requisition Management Program for Organization Level

**Table 13** shows the summary of solutions related to Area #1 Computer system

and technology.

Table 13 Summary of Solutions related to Area #1

| Solutions | Summary |
|---|---|
| Developing WISS | - Automatic functions related with supply activity at the Unit Level<br>- Provide input, correction, searching, displaying, and output<br>- Provide user-friendly environment using Web |
| Upgrading DMSS | - Provide user-friendly environment for requisition process<br>- Insert data from Unit Level automatically in DMSS<br>- Reduce selectable input data to create a requisition |
| Reducing data transferring time | - Use Electronic Bulletin Board (EBB) for data transferring<br>- Use authorized portable storage device to transfer data<br>- Use the nearest unit connected with Intranet |
| Using EBB and REMPO | - Use standardized SDI report form (MS Excel file)<br>- Collect the SDI reports using EBB or portable storage device<br>- Merge and feedback for requisitions<br>- Manage SDI/Feedback data |

Figure 15 provides a graphical representation of the requisition program to be developed. Currently, all users at Unit Level create the SDI report by hand and turn it in to the Organization Level manually regardless of Intranet availability. Step 1 represents solution #4 using REMPO and EBB. Step 2 shows solution #3 using WISS at the Unit Level. Finally, Step 3 shows all users using WISS instead of DMSS. In order to achieve Step 3, all of the Korean Army units should be connected with the Intranet, and WISS should be upgraded for the Organization Level and the Supporting Unit Level.
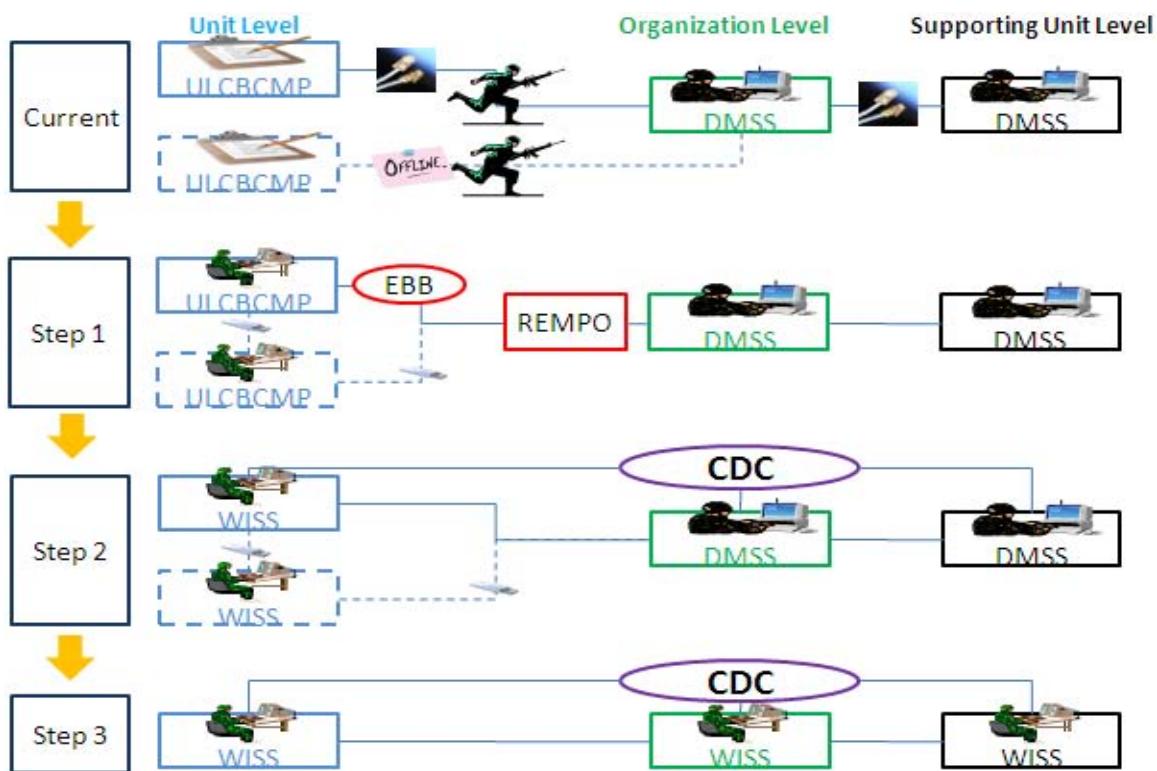


Figure 15 Development of Requisition Program

### Area #2 Information Sharing and Communication (ISC)

The focus of this area in the research involves how well information and knowledge, with regard to requisition process, is shared among echelons in the KASC,

and how well it is communicated from end-user to supply manager at the Supporting Unit Level. The causes creating requisition problems and suggested solutions are described according to interviews and relevant documents. Most of interviewees stated that ISC plays a major role in the requisition process, but it was not properly used among echelons.

**The causes leading to requisition problems**

*Cause #1Delayed feedback for SDI report*

The first cause which creates requisition process problems related to ISC is that most users at the Unit Level cannot get the feedback for their requisition (SDI report) from the supply manager at the Organization Level in a timely manner. After the end-user turns in a SDI report to the Organization Level it takes more than a week to get the feedback. In the worst case, there was no feedback for the end-user, according to an interviewee who works at the Unit Level. Delayed or no feedback for an SDI report from the Unit Level is due to two things. First, it takes a long time for the supply manager at the Organization Level to look over the SDI report because the SDI report is created by hand and the supply manager has to check it manually. The other problem is that a requisition receipt number is not given to the Unit Level from the supply manager at the Organization Level after a SDI report is turned in. This is due to there being no standardized way to give a requisition receipt number. Although the supply manager at the Organization Level manually gives a requisition receipt number for each requisition to the Unit Level, it is not tracked and not managed by the supply manager at the Organization Level due to a lack of time. The lack of requisition receipt management creates other problems, like doubled requisitions by the end-user and lack of credibility.

*Cause #2 Lack of information provided*

The second cause is the lack of ISC between the Supporting Unit Level and the Organization Level. The S4 (or Supply Sergeant) at the Organization Level also occasionally cannot obtain relevant information related to a requisition from the Supporting Unit Level. For example, when backorders happen at the Supporting Unit Level after the supply manager at the Organization Level turns in a requisition, there is no information provided with regard to when the backorder item and quantity will be released. Additionally, most interviewees at the Organization Level stated that the performance measurement results of the Supporting Unit Level are not provided for the S4 (or Supply Sergeant) at the Organization Level. There is little on information sharing and communication about it between Organization Level and Supporting Level. The performance measurements involve RER, Backorder Rate and Releasing, Supply Support Rate, etc… With regard to performance measurements, more detailed information is provided in section #4. Due to the lack of information sharing, requisition problems are not solved and repeated continuously.

*Cause #3 Lack of ISC tools*

Finally, most interviewees stated that the most important cause is the lack of tools for information technology. The lack of tools means that most end-users and the supply manager at the Organization Level are communicating with the supply manager at the Supporting Unit Level by using the phone instead of using a standardized electronic tool. However, it is not easy for the end-user to communicate with the supply managers at higher Unit Levels by phone because they do not have enough time to explain things in

detail. The end-user cannot acquire the information in a timely manner. Table 14 shows

the summary of causes related to Area #2 Information Sharing and Communication.

Table 14 Summary of Causes related to Area #2

| Causes | Summary |
|---|---|
| Delayed Feedback for SDI report | - Takes a long time to look over SDI report<br>- No feedback provide for a requisition in time<br>- Not using a requisition receipt number effectively |
| Lack of information provided | - Not enough information provide for Organization Level (e.g. when the backorder will be released)<br>- No performance measurement results provide for Organization |
| Lack of ISC tools | - Communication relying on phone<br>- Phone call requires supply manager to spend much time answering the same question from end-users<br>- Cannot provide information in a timely manner |

**The solutions to improve requisition problems**

Three solutions are suggested for mitigating the requisition problems in the

KASC, on the basis of relevant documents. Solutions are described and matched with the

causes previously mentioned.

*Solution #1 Standardizing feedback procedure*

The first solution is to standardize the feedback procedure for a SDI report

submitted in order to prevent delayed feedback. The time the Supply Manager at the

Organization Level looks over SDI reports should be reduced by using REMPO or an

upgraded DMSS function as mentioned in Area #1. The feedback for a SDI report should

be provided to the UMM at the Unit Level in one work-day. Feedback on a requisition

should include the following detailed information: accuracy of SDI report, initial reaction

at the Organization Level, progressing supply activity, and the estimated time that the

requisition can be released. All relevant information related to a requisition should be systematically offered to the UMM (Supply soldier) at the Unit Level as soon as possible. This systematic procedure can be accomplished by using WISS, which provides the automated function for requisition management. On the other hand, it is necessary to develop a standardized way to give a requisition receipt number for a SDI report. By doing so, it is possible to track and manage each requisition. With regard to the requisition receipt number, a more detailed description is presented in the next section.

*Solution #2 Improving ISC*

The second suggested solution is to improve ISC between the Organization Level and the Supporting Unit Level. To improve ISC, the Supply Manager at the Supporting Unit Level should provide relevant information related to the requisition for the S4 (or Supply Sergeant) at the Organization Level at any time. For example, if backorders happen at the Supporting Unit Level after the supply manager at the Organization Level turns in a requisition, backorder release information should be provided. Additionally, performance measurement results at the Supporting Unit Level, such as RER should be provided periodically to the Organization Level. By doing so, the same mistakes will not be repeated and the problems related to requisitions can be mitigated.

*Solution #3 Developing communication tools*

Finally, the third solution is to develop communication tools between echelons, particularly between the Unit/Organization Level and the Supporting Unit Level. The communication between the Unit Level and the Organization Level can be somewhat improved by developing WISS, upgrading DMSS, and using EBB, as previously mentioned. However, to improve ISC between the Organization Level and the Supporting

Unit Level, more tools are required. The three tools are addressed as follows on the basis of interviewees' statements and relevant documents.

(1) <u>Upgrading and Standardizing EBB</u>. With regard to EBB, all LSCs and Divisions of the Korean Army have an internal homepage on the Intranet. Currently, homepages of LSCs provide an EBB function that enables ISC related to supply activity, but most homepages of Divisions do not provide that function. Therefore, to improve ISC between the Unit Level and the Organization Level, a Division's EBB should be ungraded so that it can facilitate ISC for supply activities. One problem with current EBBs of LSCs is that their function, template, and design are totally different. This confuses users, because many users move between echelons periodically. Hence, all EBB's templates and functions related to supply activities should be standardized under the Korean Army Headquarters' control, so procedures at all echelons are the same. By doing so, the confusion of users can be reduced and EBB can become more user-friendly.

(2) <u>Using E-mail, Messenger, and Live Video Chatting (LVC) technology in the Korean Army Intranet</u>. To improve ISC between echelons, all possible tools should be developed and used, because each tool has its own benefits. These are already used in current businesses for improving ISC. Some benefits are that e-mail is cost-effective method and messenger and LVC are user-friendly methods which can reduce time delays between requisition initiation and requisition release.

(3) <u>Developing the Korean Army Supply Knowledge Integrated Searching Engine (KASKISE)</u>. This system should be an intranet-based system considering military security. The concept of KASKISE is similar to "www.Google.com". One key

characteristic of Google which leads to success in on-line business is the simplicity of

its searching engine. Although it looks very simple, most information we need is

provided. Like Google.com, KASKISE should be developed, while providing a user-

friendly environment. A search database which includes all supply information

should be built, and information in EBB previously mentioned should be linked and

updated in real-time. By doing so, users can search the information they want to know

in real time and ISC can be improved in the KASC.

Table 15 shows the summary of solutions related to Area #2 Information Sharing and

Communication (ISC).

Table 15 Summary of Solutions related to Area #2

| Solutions | Summary |
|---|---|
| Standardizing feedback procedure | - Feedback can be provided in one work-day<br>- Requisition information can be provided<br>- Develop to manage requisition receipt number |
| Improving ISC | - Provide requisition information for S4 (or Supply Sergeant)<br>- Provide performance measurement result for S4 |
| Developing communication tools | - Upgrade and Standardize EBB<br>- Use E-mail, Messenger, and Live Video Chatting (LVC)<br>- Develop KASKISE |

### Area #3 Logistics Policy and Regulation (focus on SDI)

This section describes the causes and solutions related to the Korean Army

Logistics policy and regulations, with regard to SDI. As previously mentioned in Chapter

2, the Korean Army Regulation (2007) defines SDI as the inspection of all supplies

within a Unit to keep the Unit's equipment and materiel in the best condition for

maintaining combat readiness. According to LMMIP (2006), SDI procedures consist of

Planning, Execution, and Reporting a SDI result to the Organization Level. SDI plays an

important role in Organizational Supply as a requisition activity. Therefore, this section focuses on the improvement of SDI regulations.

**The causes leading to requisition problems**

*Cause #1 Lack of criteria SDI item classification*

The first cause is the lack of criteria for SDI item classification. As previously described in Table 3 of Chapter 2, currently the SDI item is divided into periodic inspection items (23 items) and non-periodic inspection items (121 items). The periodic inspection items include individual equipment and individual clothes: combat helmet, combat boots, pistol belt, combat backpack, combat clothing, tent, etc... The non-periodic inspection items include all other materials: unit equipments, office furniture, cabinets, kitchen equipment/appliances, household furnishings, etc... However, the current classification method of SDI items is not efficient because the classification only takes into account the criteria of whether it is directly related to combat material or not. In other words, it does not consider other factors such as duration, consumption frequency, NIIN, and usage. Therefore, the current classification method of SDI items creates inefficiencies in supplies management, particularly in regard to SDI management. More detailed examples are described as follows.

- The supplies which are frequently consumed or become unserviceable are not inspected and reported in time. Because the SDI is conducted according to a scheduled plan the date to inspect the item is already designated regardless of current item condition. For example, in case an item is consumed during an unscheduled SDI plan period, the item is not requested by SDI report.

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- There are more than 144 items within a unit and the number of items is different between units depending on their mission. On the other hand, all supplies in the Korean Army are managed by NIIN. For example, a combat backpack is not one item but it consists of four: a body of backpack, a frame, a band for the shoulder, and a support for the waist. However, most of end-users, UMMs, and supply soldiers do not differentiate components of an item set because the SDI item list is not managed according to NIIN.

For these reasons, the current classification method of SDI items leads to problems between the Unit Level and the Organization Level.

*Cause #2 Lack of regulation about SDI planning and execution*

The second cause that creates requisition process problems is the regulation related to SDI planning and execution considering personnel and time. With regard to personnel, the focus is on "who to plan" and "who to inspect"? The focus related to time is on "when to plan" and "when to inspect (how often to inspect)". The summary is shown Table 16, according to current Logistics Policy and Army Regulation.

Table 16 SDI Planning and Inspection related to Personnel and Time

| Classification | | Policy and Regulation |
|---|---|---|
| Personnel | Planning | - S4 (Supply Officer) or Organizational Supply Sergeant (OSS) ( Isolated units plan by themselves, and then report to its organization) |
| | Inspection | - Unit commander is responsible for the execution of SDI<br>- Squad leader inspects the periodic inspection item<br>- ASS inspects the non-periodic inspection item |
| Time | Planning | - Initial quarterly SDI should be planned before beginning new quarter<br>- It can be modified by Weekly Training Plan changes |

| | | |
|---|---|---|
| | Inspection | - Periodic Inspection Item: one time in training period quarterly<br>- Non-periodic Inspection Item: one time in Unit Management Period<br>- SDI is performed on-duty time or off-duty time in one work day |

<div align="right">(Adapted from Korea AR, 2007)</div>

On the basis of the above Table, several problems related to Personnel and Time of the SDI are described as follows.

(1) There is no standardized SDI plan form in the Korean Army. Most of the Organization Levels use different SDI plan forms by hand. That makes the planner spend more time.

(2) When the SDI plan given from the Organization Level was changed or was not completed in a scheduled day, those are not reported to the Organization Level in most cases. As a result, the execution of the Unit's SDI is not well controlled and supervised by the Organization Level.

(3) Squad leaders are responsible for periodic inspection items, but they do not have much knowledge of the items. In many cases they do not differentiate the condition of the item, which involves serviceable, maintenance required, or unserviceable due to lack of standard. Thus, the Squad leader has a tendency to report incorrect SDI results to the UMM.

(4) The UMM (Supply soldier) accounts for non-periodic inspection items during the Unit Management Period; however, the UMM cannot accomplish the SDI for over 121 items in a scheduled time. He is responsible for all of the Unit's administrative and supply tasks.

For these reasons, personnel and time related to SDI also cause requisition problems between the Unit Level and the Organization Level.

*Cause #3 Lack of regulation about SDI reporting*

The third cause is the regulation related to the way to create and report a SDI result. According to LMMIP (2006), SDI results should be recorded in the Unit Activity Record Book after a SDI, and it should be reported to the Organization Level weekly. After submitting a SDI report, UMM should receive a requisition receipt number. Unscheduled items can be included in weekly SDI reports. The four problems with SDI reports are addressed as follows.

(1) With regard to the SDI reporting cycle, the first problem is that the day to report a SDI result is not prescribed and the time to submit a SDI report is also not stipulated in current policy and regulation. Weekly reporting policy has a serious problem related to requisition process time because "weekly" involves the possibility of a requisition delayed one week. For example, suppose that a Unit which reports SDI results every Friday completes the next SDI about combat boots on Monday and the requisition quantity is 5. In this case, the requisition for 5 combat boots will be included in the next weekly SDI report. The requisition process time spent at the Unit Level is at least 4 days.

(2) In most cases UMMs do not include unserviceable items or unexpected maintenance required items in a periodic SDI report, although it is possible to add a sudden requisition item into the SDI report at any time. There are two reasons for this. One reason is that the UMM does not find it due to lack of SDI system. The other reason is that the UMM does not include it due to lack of knowledge about relevant policy.

According to the interviewees, most SDI results were reported weekly, not including unscheduled items. This problem sometimes makes the worst situation. For example, suppose that a Unit which reports SDI results every Friday completed a combat boots inspection on Friday as a scheduled SDI and unexpectedly a requirement for 3 combat boots occurs next Monday. In this case, the requisition for 3 combat boots will not be included in the SDI report until the next scheduled combat boots SDI day. The requisition process time spent at the Unit Level is 2 to 3 weeks.

(3) When a SDI report is submitted, according to logistics policy, a requisition receipt number should be used as a confirmation number. However, there is no detailed way to use the requisition receipt number in that policy and regulation, so it is usually not used in Organizational Supply. For this reason, most requisitions at the Unit Level cannot be tracked.

(4) When it comes to the SDI report form, the current form does not include essential content about SDI results. The form includes the item number, NIIN, UI, PC, Authorized Quantity (AQ), Current Retention Quantity (CRQ), Requisition Quantity (RQ), Turn-in Quantity (TQ), Consumption Quantity (CQ), and Tool Code (TC) as shown in Table 4, in Chapter 2. There is no information about the previous RQ, TQ, and CQ. That creates a large requisition problem related to quantity. For example, suppose that the requisition for five combat boots was reported previously and it was not issued from the Organization Level. In this situation, unexpectedly, three combat boots are requirement today and it should be included in the SDI report. In this case, according to current SDI report form, the requisition quantity is eight, although the actual requisition quantity is three. The following calculations show the reason.

- Requisition Quantity (RQ) = AQ – CRQ + D level quantity

    * Assuming that AQ is 50, initial CRQ is 50, initial D level quantity is 0

- Previous RQ = 50 – 50 + 5 = 5 combat boots

- Next RQ = 50 – 45 + 3 = 8 combat boots

Table 17 shows the summary of causes related to Area #3 Logistics Policy and Army

Regulation.

Table 17 Summary of Causes related to Area #3

| Causes | Summary |
|---|---|
| Lack of criteria for SDI item Classification | - Only takes into account whether directly related with combat material or not.<br>- Does not consider the factors such as Duration, Consumption Frequency, NIIN, and Usage.<br>- There are more than 144 items within a Unit, and SDI item list is not managed by NIIN |
| Lack of regulation about SDI planning and execution | - There is no standardized SDI plan form<br>- The execution of Unit's SDI is not well controlled and supervised by Organization Level<br>- Overburden of UMM (or Supply soldier) for accomplishing SDI |
| Lack of regulation about SDI reporting | - The day and time to report a SDI result is not prescribed<br>- SDI result is reported weekly, and it does not include unscheduled items<br>- There is no detailed way to use the requisition receipt number<br>- Current form does not include prerequisite content; previous requisition information |

**The solutions to improve requisition problems**

To mitigate the requisition problems with regard to Logistics Policy and Army

Regulation, three solutions are suggested according to in-depth study of current policies.

Solutions are described, while matching them with the causes previously mentioned.

*Solution #1 Reclassifying SDI items*

The first solution is the reclassification of SDI items considering various factors: degree of combat mission relevance, duration, consumption (or turn-in) frequency, seasonal characteristic, usage, and etc. Standard procedure to reclassify SDI items is addressed in detail as follows.

- List all supply materials of the Unit Level on the basis of TO&E and SBMA

- Manage the list according to NIIN; differentiating each component of set item

- Set the priority of each item considering various factors previously mentioned

- Categorize the item from the view of who can accomplish SDI efficiently (Unit Commander, UMM, Supply soldier, Squad leader, or Soldiers)

- Designate the responsibility of each person

- Decide the inspection period according to the categorization

*Solution #2 Improving the environment with SDI planning and execution*

The second solution is to improve the environment with planning and execution. Several ways to improve the environment are addressed as follows.

(1) A standard SDI plan form should be used in the Korean Army. Also, this standard SDI form should be included in WISS, previously mentioned in Area #1. The planning of SDI at the Organization Level should be automated in WISS. That makes the planner spend less time.

(2) SDI planning is completed and controlled in WISS. The SDI planner can be either an S4 (Supply Sergeant) at the Organization Level or a UMM at the Unit Level. When SDI Plan is changed or is not completed on a scheduled day, the correction of

schedule can be completed easily. As a result, the execution of a Unit's SDI can be well controlled and supervised by its organization.

(3) Enough relevant knowledge and education opportunity should be provided to each responsible person for SDI. For example, it is necessary to provide a standard book which includes how the SDI item can be differentiated by condition: serviceable, maintenance required, and unserviceable. The book can be digitalized and included in WISS.

The second solution is strongly related to developing WISS. The planning in WISS enables the logistician at the Unit/Organization Level to spend less time and effort.

*Solution #3 Improving the environment with SDI reporting procedure*

Finally, the third solution is to improve the SDI reporting procedure. Several ways to improve the way to create and report SDI results are addressed as follows.

(1) With regard to the SDI reporting cycle and time, when the requisition is created at the Unit Level, SDI results should be reported as soon as possible. The policy of weekly SDI reporting should be changed to daily SDI reporting. This will contribute to minimizing delayed requisitions at the Unit Level.

(2) The UMM has to include unserviceable items or maintenance required items that occur unexpectedly in the daily SDI report, because it is possible to add a sudden requisition item in the SDI report at any time.

(3) When it comes to a requisition receipt number for a SDI report submitted, it is necessary to determine a detailed way to use the requisition receipt number. A suggested way is to treat it as a DN (Document Number) in DMSS. As previously mentioned in Chapter 2, a DN is a 22 digit numeric code that uniquely identifies each

transaction. It consists of 10 digits of the UIC, 8 digits of the Date created, and 4

digits of the serial number. Therefore, when a requisition occurs, a DN should be

created for that requisition. Creating a DN for the requisition at the Unit Level can be

accomplished in WISS. Until this is developed in WISS, users at the Unit Level can

input the DN in the SDIreport.xls file of REMPO.

(4) Assuming that a DN is used for managing each requisition at the Unit Level, it is not

necessary to add information about the previous Requisition Quantity, Return

Quantity, and Consumption Quantity. Instead, the SDI report form should be

digitalized in WISS, while including DN content.

Three suggested solutions are summarized in Table 18, to provide brief understanding.

Table 18 Summary of Solutions related to Area #3

| Solutions | Summary |
|---|---|
| Reclassifying of SDI item | - List all supply materials and manage the list according to NIIN<br>- Set the priority of each item considering various factors<br>- Categorize the item and designate the responsibility<br>- Decide the inspection period |
| Improving the environment with planning and execution | - Standard SDI plan form should be used and included in WISS<br>- SDI planning should be completed and controlled in WISS<br>- Enough knowledge and education should be provided |
| Improving SDI reporting procedure | - Weekly SDI reporting should be changed into daily based<br>- Should be able to add a sudden requisition item into SDI report at any time<br>- Requisition receipt number should be treated as DN in DMSS<br>- SDI report form should be digitalized in WISS |

### Area #4 Performance Measurement

Traditionally, according to Neely et al. (1995), performance measurement is

defined as the process of quantifying an action for measuring the effectiveness and

efficiency of past action. Sink and Tuttle (1989) claim that you cannot manage what you

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cannot measure. In current business management, performance measurement is universally used to assess how well an organization or a program is managed to get desired results. Performance measurement plays a major role in improving supply management in the KASC.

The focus of this area involves how well performance measurement is used with regard to the requisition process at the Unit Level/Organization Level and how it can be improved.

Before describing the causes, some information about the SPMI is addressed, in order to provide understanding of the current Supply Performance Measurement Indicators (SPMIs) in the KASC.

**Current SPMIs in the KASC**

All Supporting Units in the KASC assess the SPMIs periodically. In most cases they are evaluated quarterly. The assessment of the SPMIs is required by the Korean Laws: Logistics Materiel Management Law Enforcement Ordinance 12-2 and Enforcement Regulation 10-2. The SPMIs are addressed according to Korean Army Regulation as follows.

- Authorized Stockage List (ASL) Rate

$$\text{ASL rate (\%)} = \frac{\text{Number of ASL items}}{\text{Total number of Supply items}} \times 100$$

  - ASL is a list of authorized supply items should be stocked at Supporting Unit Level to satisfy customer's demand immediately.

- Demand Accommodation Rate (DAR)

$$\text{DAR (\%)} = \frac{\text{Total valid ASL requisition cases received}}{\text{Total valid requisition cases received}} \times 100$$

- Supply Sustaining Days (SSD)

$$\text{SSD(days)} = \frac{\text{Current inventory retained}}{\text{Average Daily Demand (ADD)}}$$

- Supply Release Rate (SRR)

$$\text{SRR (\%)} = \frac{\text{Total cases released immediately}}{\text{Total valid ASL requisition cases}} \text{ X 100}$$

- Supply Support Rate (SSR)

$$\text{SSR (\%)} = \frac{\text{Total cases released}}{\text{Total valid requisition cases}} \text{ X 100}$$

- Inventory Backorder Rate (IBR)

$$\text{IBR (\%)} = \frac{\text{Number of Backorder items}}{\text{Total number of ASL items}} \text{ X 100}$$

The following SPMIs are not prescribed in the Laws but are used to measure the requisition process and customer satisfaction in the KASC.

- Requisition Error Rate (RER)

$$\text{RER (\%)} = \frac{\text{Number of requisition error cases}}{\text{Total requisition cases (valid requisition cases + requisition error cases)}} \text{ X 100}$$

- Requisition Denial Rate (RDR)

$$\text{RDR (\%)} = \frac{\text{Number of requisition cases denied}}{\text{Total requisition cases (valid requisition cases + requisition error cases)}} \text{ X 100}$$

- Customer Wait Time (CWT): It is a new SPMI to assess customer satisfaction of the Organization Level.

- CWT = The date Organization Level received materiel – The date Organization Level created a requisition

- Requisition Wait Time (RWT): It is a new SPMI to assess customer satisfaction of the Supporting Unit Level.

    - RWT = The date lower Supporting Unit Level received materiel – The date lower Supporting Unit Level created a requisition

**The causes leading to requisition problems**

According to interviews and relevant documents, the causes related to performance measurement that create requisition problems are described. Most of interviewees at the Organization and Supporting Unit Level stated that there are not efficient performance measurements to eliminate requisition problems.

*Cause #1 SPMIs focused on Supporting Units*

The first cause related to performance measurement from interview results is that there is no standardized performance measurement of requisitions between the Unit Level and the Organization Level. More precisely, there is no performance measurement of SDI activity. As previously described, SDI is the critical activity to keep a unit's materiel in the best condition, to maintain combat readiness, and to create a requisition. In spite of the importance of SDI activity, currently there is no efficient way to assess the performance of SDI activity. Most of the interviewees' statements were simply "SDI is not performed well!" To find the problem and to improve it, a performance measurement of SDI should be developed.

*Cause #2 Lack of current SPMIs effectiveness*

The second cause is that current performance measurement between the Organization Level and the Supporting Unit Level is focused on the view of the Supporting Unit Level. As mentioned previously, several SPMIs are used, but all indicators are analyzed from the view of the Supporting Unit Level. There is no indicator for the Organization Level. CWT is used to improve customer satisfaction; however, that indicator does not assess the entire CWT. The current CWT only assesses the time between the Supporting Unit Level and the Organization Level, excluding the Unit Level. With regard to the current CWT, the Organization Level is regarded as the end-user; however, the real end-user in the KASC is the Unit Level, such as the Infantry Company (or Soldiers).

*Cause #3 No feedback of the SPMIs*

Finally, the third cause is the lack of an analysis and feedback system of performance measurement results. The current SPMIs cannot assess entirely the supply activities related to the requisition process, as mentioned previously. Moreover, the SPMI assessment results are not analyzed in detail and also they are not provided to the Organization Level or the Unit Level. There is no feedback between echelons with regard to supply management, particularly with regard to managing the requisition process.

In summary, the causes related to Area #6 Performance Measurement are;

- The SPMIs focus on the supply activities of the Supporting Unit Level.

- The current SPMIs cannot entirely assess the supply activities in Organizational Supply.

- There is no feedback of the SPMIs between the Unit/Organization Level and the Supporting Unit Level.

**Relevant document research for solutions**

To provide understanding of the metrics to be suggested and to get the conceptual framework of the metrics, the relevant documents related to the metrics are delved into through an in-depth study using two resources: the metrics in business and the U.S. Army's current SPMIs.

*The metrics in business*

According to Wikipedia (2009), the free encyclopedia, a metric is defined as "a standard unit of measure, such as part of a system of parameters, or systems of measurement". It is a set of ways to measure, assess, control or select a person, process, event, or institution quantitatively and periodically. According to Melnyk et al. (2004:209), "metrics and performance measurement are critical elements in translating an organization's mission, or strategy, into reality." Deru and Torcellini (2005) claimed that metrics need certain characteristics to be valuable and practical. A performance metric should include the following:

- Be measurable (or able to be determined from other measurements).

- Have a clear definition, including boundaries of the measurements.

- Indicate progress toward a performance goal.

- Answer specific questions about the performance.

The metrics should be consistent with performance objectives and performance, and must be directly related to the performance objectives. If the performance of the requisition process is to be tracked or improved, specific performance goals should be set and performance metrics selected to measure progress toward the performance goals. (Deru and Torcellini, 2005)

The establishment of performance goals can best be specified when they are defined within three primary levels (California University Approach, 2005):

- Objectives: Broad, general areas of review. These generally reflect the end goals based on the mission of a function.

- Criteria: Specific areas of accomplishment that satisfy major divisions of responsibility within a function.

- Measures: Metrics designed to drive improvement and characterize progress made under each criterion.

According to the California University Approach (2005), the first step in developing performance metrics is to involve the people who are responsible for the work to be measured because they are the most knowledgeable about the work. Once these people are identified and involved, it is necessary to:

- Identify critical work processes and customer requirements.

- Identify critical results desired and align them to customer requirements.

- Develop measurements for the critical work processes or critical results.

- Establish performance goals, standards, or benchmarks.

Additionally, Bourne (2008) addressed four performance measurement processes: designing the performance measurement system, implementing the performance measurement system, using the performance measurement system, and updating the performance measurement system.

*U.S. Army's Current SPMIs*

The SPMIs which are currently used by the U.S. Army are introduced to benchmark the U.S. Army's performance measurement for the Korean Army's new

SPMIs. According to U.S. AR 710-2 (2008), there are two types of SPMIs for assessing the effectiveness of supply performance. One type reflects the supply management at the Unit Level with regard to stock record accounts and unit or property book operations against established Department of the Army (DA) standards.

According to U.S. AR 710-2 (2008), the SPMIs related to requisitions from the Unit Level are addressed as follows.

(1) Inventory accuracy. This represents the number of inventoried items having no overages or shortages compared to the total number of items inventoried and is expressed as a percentage.

(2) Request processing time. This is the timeframe expressed in the number of days from the time the customer's request is received by the Property Book Officer (PBO) to the time the request is received at the Supply Support Activity (SSA).

(3) Receipt processing time. This is the timeframe expressed in the number of days from the time the PBO receives the supplies to posting of the receipts to the property book. This applies to all supplies received by the PBO, except for those supplies received without documentation or requiring item identification research.

(4) Issue processing time. This is the timeframe expressed in the number of days from when an item is posted to the property book and issued to the customer.

(5) Turn-in processing time. This is the timeframe expressed in the number of days from when an item is identified as excess or unserviceable, not repairable, to when the PBO initiates a turn-in document.

(6) Turn-in receipt processing time. This is the timeframe expressed in the number of days upon receipt of an SSA's confirmation of a turn-in to posting of the property book and document register.

(7) Document accuracy. This includes the Property authorization document, Supply request accuracy, and Document register (due in) accuracy.

The second type reflects the performance of the supply support at Supporting Unit Level. The SPMIs related to the requisition are addressed as follows. (U.S. AR 710-2, 2008)

(1) Demand satisfaction or net availability. This process is the percentage of all valid demands for ASL items that were filled to a level of at least 90 percent. It is a function of ASL depth (measuring the quantities stocked for any given ASL line).

- ASL demand satisfaction: Valid ASL demands completely filled divided by total valid ASL demands, times 100, equals the percentage of demand satisfaction.

- Demands for items issued by the self-service supply center (SSC) is included in the demand satisfaction computation by an adjustment. This adjustment assumes that demands for SSC items are relatively uniform. This assumption allows SSC demand satisfaction to be represented as a function of their items at zero balance. SSC zero balances must be determined by counting them. Use the formula $(A \times B) - (C \times D) \times (100)$ = adjusted demand satisfaction; where A = the percentage of total ASL lines that are SSC; B = the percentage (in decimal form) of SSC lines at zero balance subtracted from the number one; C = the percentage of total ASL lines that are not SSC (one minus

quantity above); and D = normal ASL demand satisfaction percentage (performance objective).

(2) Zero balance(s) with dues-out. This balance indicates the ASL lines at zero balance with dues-out (DO) as a percentage of the total number of ASL lines. It does not necessarily reflect performance of the supply activity, but may indicate a condition within the overall supply system. The formula for zero balance with dues-out is—ASL zero balance lines w/DO, divided by total ASL lines, times 100, equals the percentage of zero balance(s) w/DO (performance objective).

(3) Materiel release denial rate. This reflects the number of materiel release denials (MRDs) as a percentage of all materiel release orders (MROs). The formula for materiel release denial rate is—MRD, divided by total MRO, times 100, equals the percentage of MRD rate.

(4) Receipt processing time. This processing is the timeframe expressed in hours from the time supplies arrived at the SSA to posting of receipts to the stock record account's formal accounting record. This processing applies to all supplies received by the SSA except for those supplies received without documentation or requiring item identification where research must be conducted.

(5) Request processing time. This processing is the timeframe expressed in hours from the time the customers' request was received by the SSA to the time the request was processed for issue or passed to the higher supply source. Rejections are not included. This process applies to all customer requests regardless of priority.

(6) Requisition Wait Time. This is measured in the actual number of days that elapse between the document date of a non-backordered requisition and the date the receipt is posted to the stock accounting record.

(7) Average Customer Wait Time. Average time in days, developed at a forward distribution point, required to satisfy customer demands, regardless of whether the demand was for a stocked or non-stocked item, or whether or not the demand was satisfied from stock on hand at the forward distribution point.

The findings from the U.S. Army's current SPMIs are that the U.S. Army uses more various indicators at different echelons than the Korean Army and the indicators focus on customer satisfaction from Combat Units. The U.S. Army's SPMIs related to requisition process are summarized in Table 19.

Table 19 Summary of the U.S. Army's SPMIs

| Types | Indicator | Objective | Management Level |
|---|---|---|---|
| Unit Level | Inventory accuracy | 100% | 95~100% |
| | Request processing time | 2 days | 4 days or less |
| | Receipt processing time | 1 day | 3 days or less |
| | Issue processing time | 2 days | 4 days or less |
| | Turn-in processing time | 5 days | 10 days or less |
| | Turn-in receipt processing time | 1 day | 3 days or less |
| | Document accuracy | 100% | 95~100% |
| Supporting Unit Level | Demand satisfaction or net availability | at least 90% | - |
| | Zero balance(s) with dues-out | 0% | - |
| | Materiel release denial rate | 1% | - |
| | Receipt processing time | 24 hours | - |
| | Request processing time | 24 hours | - |
| | Requisition Wait Time | - | - |
| | Average Customer Wait Time | 10~20 days | - |

(Adapted from U.S. AR 710-2, 2008)

**The solution to improve requisition problems**

The suggested solution is to develop the metrics, particularly the new SPMIs, in order to assess entirely the supply activities in Organizational Supply. On the basis of the relevant information previously mentioned, the framework of metrics for requisition process performance is established and the metrics are suggested. The objective of the metrics is to improve the requisition process in Organizational Supply. The criteria of metrics are based on the major issues with the requisition process of the KASC: Inventory Accuracy, Document Accuracy, Issuing Supplies, Turn-in Supplies, SDI, Requisitioning, Customer Satisfaction, and Supply Activity with focus on the Combat Unit. New suggested SPMIs are divided into time-frame indicators and rate-frame indicators, for the echelons: Unit Level, Organization Level, and Supporting Unit Level. To provide an understanding of the new SPMIs, the flow of the requisition process is shown as Figure 16.
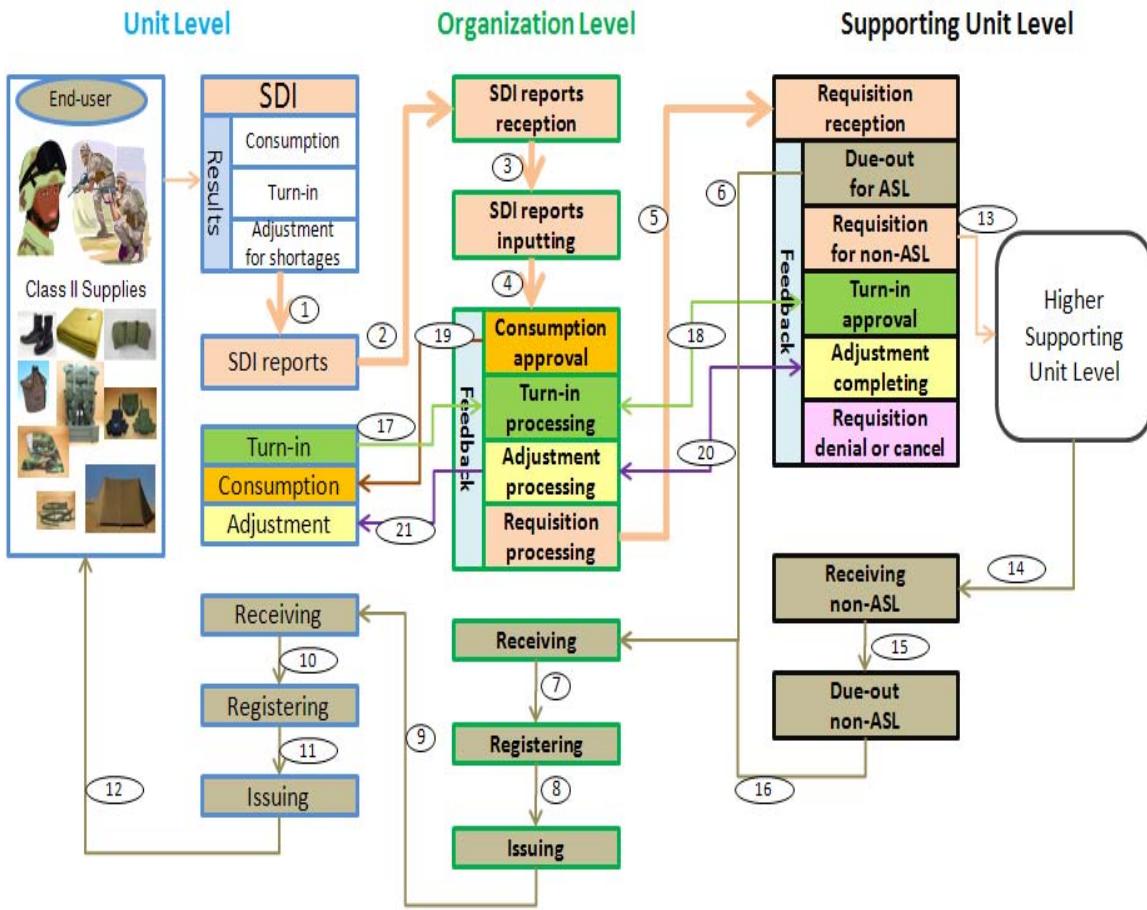
Figure 16 Flow of requisition process related to the new SPMIs

The new SPMIs are explained according to each process as follows. The traditional

indicators which should be assessed according to Korean Laws are not presented.

*The new SPMIs at the Unit Level*

(1) Authorization and Retaining Rate (ARR). This represents the number of supplies

on hand compared to the total number of supplies authorized and is expressed as a

percentage.

(2) SDI report processing time. This is the timeframe expressed in the number of days from the time the SDI is accomplished to the time the SDI report is received at the Organization Level. (The time: Processes #1 + #2)

(3) Consumption processing time. This is the timeframe expressed in the number of days from when an item is identified as unserviceable, not repairable but consumable, to when the item is authorized to be consumed from the property book by Organization Level. (The time: Processes #1 + #2 + #3 + #4 + #19)

(4) Turn-in processing time. This is the timeframe expressed in the number of days from when an item is identified as excess or unserviceable, not repairable, to when the item is authorized to be turned-in from the property book by the Supporting Unit Level. (The time: Processes #1 + #2 + #3 + #4 + #17 + #18)

(5) Receiving processing time. This is the timeframe expressed in the number of days from when SDI is accomplished to when the item is received by the UMM at the Unit Level. (The average time: the average of Processes #1 + #2 + #3 + #4 + #5 + #6 + #7 + #8 + #9 and Processes #1 + #2 + #3 + #4 + #5 + #13 + #14 + #15 + #16 + #7 + #8 + #9)

(6) Receipt processing time. This is the timeframe expressed in the number of days from the time the UMM at the Unit Level receives the supplies to posting of the receipts to the property book. This applies to all supplies received by the UMM, except for those supplies received without documentation or requiring item identification research. (The time: Process #10)

(7) Issue processing time. This is the timeframe expressed in the number of days from when an item is posted to the property book and issued to an end-user. (The time: Processes #11 + #12)

*The new SPMIs at the Organization Level*

(1) Authorization and Retaining Rate (ARR). This represents the number of supplies on hand compared to the total number of supplies authorized and is expressed as a percentage. This can be calculated according to each Unit Level, the condition of supplies, and each item.

(2) SDI report input processing time. This is the timeframe expressed in the number of days (or hours) from the time the SDI report is received at the Organization Level to the time the SDI report is input into the DMSS at the Organization Level. (The time: Process #3)

(3) Consumption approval time. This is the timeframe expressed in the number of days from when an item is identified as unserviceable, not repairable but consumable, to when the item is authorized to be consumed from the property book by Organization Level. (The time: Processes #1 + #2 + #3 + #4 + #19)

(4) Turn-in processing time. This is the timeframe expressed in the number of days from when an item is identified as excess or unserviceable, not repairable, to when the item is authorized to turned-in from the property book by the Supporting Unit Level. (The time: Processes #1 + #2 + #3 + #4 + #17 + #18)

(5) Receiving processing time. This is the timeframe expressed in the number of days from when SDI is accomplished to when the item is received by UMM at the Unit Level. (The average time: average of Processes #1 + #2 + #3 + #4 + #5 + #6 + #7

+ #8 + #9 and Processes #1 + #2 + #3 + #4 + #5 + #13 + #14 + #15 + #16 + #7 +
#8 + #9)

(6) Receipt processing time. This is the timeframe expressed in the number of days
from the time the S4 (or Supply Sergeant) at the Organization Level receives the
supplies to posting of the receipts to the property book in DMSS. This applies to
all supplies received by the S4 (or Supply Sergeant) except for those supplies
received without documentation or requiring item identification research. (The
time: Process #7)

(7) Issue processing time. This is the timeframe expressed in the number of days from
when an item is posted to the property book in DMSS and issued to Unit Level.
(The time: Processes #8 + #9)

(8) SDI plan Changing Rate. This reflects the number of SDI plan item changed as a
percentage of all SDI plan items. The formula for SDI plan Changing Rate is—the
number of SDI plan items changed, divided by total number of SDI plan items,
times 100.

(9) SDI Performance Rate. This reflects the number of SDI plan items accomplished
as a percentage of all supplies at the Unit Level. This can be accomplished by
each Unit Level, and then it can be compared.

*The new SPMIs at Supporting Unit Level*

(1) Authorization and Retaining Rate (ARR). This represents the number of supplies
on hand compared to the total number of supplies authorized and is expressed as a
percentage. This can be calculated according to each Organization Level, the
condition of supplies, and each item.

(2) Request processing time. This processing is the timeframe expressed in days from the time the request about Non-ASL items at the Organization Level was received by the Supply Manager at Supporting Unit Level to the time the request is transferred to the higher Supporting Unit Level and the non-ASL items are received. (Time: Processes #13 + #14)

(3) Average Customer Wait Time (ACWT). Average time in days, from the time the SDI at the Unit Level is accomplished to the time the requested supplies are issued to the end-user (Soldiers) at the Unit Level and other needs are released, regardless of whether the demand was for a stocked or non-stocked item. This represents the entire requisition processing time between end-users and the Supply Supporting Unit Level. The significant difference between currently used CWT and the suggested ACWT is that current CWT measures the time between organizations and supporting units; however, the new ACWT measures the time between units and supporting units.

(4) Customer Satisfaction Rate. This represents the number of customers being satisfied with regard to the requisition process compared to the total number of customers at the Organization Level and is expressed as a percentage.

Assessing the new SPMIs should be automated by upgrading DMSS and developing WISS. In addition, the results of SPMIs should be shared between echelons to improve requisition problems and to increase the credibility between echelons. Table 20 shows the summary of the new SPMIs related to Area #4 Performance Measurement.

Table 20 Summary of the new SPMIs related to Area #4

| Classification | Time-frame | Rate-frame |
|---|---|---|
| Unit Level | - SDI report processing time<br>- Consumption processing time<br>- Turn-in processing time<br>- Receiving processing time<br>- Receipt processing time<br>- Issue processing time | - Authorization and Retaining Rate |
| Organization Level | - SDI report input processing time<br>- Consumption approval time<br>- Turn-in processing time<br>- Receiving processing time<br>- Receipt processing time<br>- Issue processing time | - Authorization and Retaining Rate<br>- SDI plan Changing Rate<br>- SDI Performance Rate |
| Supporting Unit Level | - Request processing time<br>- Average Customer Wait Time (ACWT) | - Authorization and Retaining Rate<br>- Customer Satisfaction Rate |

### Area #5 Education and training

From Wikipedia (2009), the free encyclopedia, education is defined as that "the learning of knowledge, information and skills during the course of life". Training refers to "the acquisition of knowledge, skills, and competencies as a result of the teaching of vocational or practical skills and knowledge that relate to specific useful competencies". Additionally, military education and training is defined as "a process which intends to establish and improve the capabilities of military personnel in their respective roles". In the Korean Army, the purpose of education is to gain the knowledge in a professional area. Training is to develop skills to operate technical equipment or to accomplish technical works.

Based on the Korean Army education and training system, the education and training for a person at the Unit Level/Organization Level is broken down into two sub-

categories. One is the Military School Education which involves advanced training for chosen or assigned specialties. The other is the Unit Education which involves On-the Job Training (OJT) and Specialty Education for developing proficiency.

The focus of this area is how well education and training occur with regard to a requisition process accomplished for a person (Supply soldier / Supply noncommissioned officer; S-NCO) at the Unit Level/Organization Level. The causes related to education and training that create requisition problems, along with suggested solutions, are described according to interviews and relevant documents. Most interviewees stated that many requisition problems occur due to the lack of an education and training system for supply. Detailed causes and solutions are described next.

**The causes leading to requisition problems**

*Cause #1 Lack of education environment*

The first cause of requisition process problems is the lack of an education environment for personnel below the Organization Level. According to interviewees', not all personnel in supply working below the Organization Level have the necessary specialty education. Some supply soldiers have to perform supply tasks, without any previous Military School Education related to their mission. Furthermore, there is no standard guide for personnel below the Organization Level, such as Supply Management Field Manuals (SMFMs). Existing SMFMs do not include information on Organizational Supply management, and are not distributed to the Unit/Organization Level. According to the interviews from the Supporting Unit Level, even though personnel below the Organization Level took the relevant courses in Military School, they have no detailed knowledge. They also had difficulty operating supply management software such as

ULPBCMP and DMSS proficiently. One reason for the lack of knowledge is that education related to supply management is not considered as important as combat skill training below the Organization Level. For example, a performance measurement of supply specialty proficiency below the Organization Level is not included in the Unit's capability performance measurement.

*Cause #2 Gap between education and actual execution*

The second cause is the gap between Military School Education and real field tasks. Thus, Supply soldiers and S-NCOs cannot directly apply the knowledge gained from their education to real supply tasks. Most S-NCOs at the Organization Level also stated that there were some differences between what they learned and actual execution. In addition, they stated that there were many things that they had to study by themselves. For example, although they learned that the requisition receipt number should be used for the SDI report, it has not been used in real supply tasks. According to interviewees, supply soldiers and S-NCOs have to use ULPBCMP without any previous education, relying on their own course of study.

*Cause #3 Lack of refresher education*

Finally, the most important cause according to most interviewees is the lack of refresher education to update military knowledge by recall and reinforcement of previously acquired knowledge and skills. In the case of Supply soldiers, there is no opportunity to gain current knowledge after finishing specialty education. Not all S-NCOs have Refresher Education opportunities either. Current off-line refresher education does not provide an educational opportunity for all personnel below the Organization Level. Furthermore, according to interviewees' statements, current Military School

education has significant limitations: instructors, budget, time, facilities, etc... Therefore, most of the education and training for supply soldiers relies is OJT and their own initiatives. Table 21 shows the summary of causes related to Area #5 Education and training.

Table 21 Summary of Causes related to Area #5

| Causes | Summary |
|---|---|
| Lack of education environment | - Not all Supply soldiers have necessary specialty education<br>- No standard guide for personnel below Organization Level<br>- Education related to supply management is not considered as as important as combat skill training |
| Gap between education and actual execution | - Differences between what they learned and actual execution (e.g. using requisition receipt number and using ULPBCMP) |
| Lack of refresher education | - For Supply soldiers, no more refresher education opportunity<br>- Not all S-NCOs have opportunity<br>- Relying on just OJT and their own initiatives |

**The solutions to improve requisition problems**

To mitigate the requisition problems with regard to Education and Training, three solutions are suggested on the basis of relevant documents. Solutions are described, while matching them with the causes previously mentioned.

*Solution #1 Providing a self-education environment*

The first solution is to providing a self-education environment for Supply soldiers who have no previous Military School Education. The best way is to educate all supply soldiers at Military School to improve their capability, but it is not possible considering the current education environment. To ensure a self-education environment, several prerequisite conditions should be implemented as follows.

- Publish and provide the standard book that includes what they need to know with regard to requisitions: Logistics policy / relevant Army regulation, detailed requisition procedure, ULPBCMP / DMSS, know-how from UMM (or Supply soldiers), etc... It is recommended that the standard book be published as a type of Field Manual or detailed information should be added into previously published Field Manuals.

- Ensure the time to self-study and test the ability to accomplish the mission. Personnel below the Organization Level who already have an education also need self-education to keep current. Additionally, the performance measurement of supply specialty knowledge below the Organization Level should be included in the Unit's capability performance measurement. By doing so, the capability of supply soldiers and S-NCOs will be improved.

*Solution #2 Minimizing the gap between education and real field tasks*

The second solution is to minimize the gap between Military School Education and real field tasks. The reason for the gap is that Military School Education cannot cover enough material due to limitations in time and other conditions. Therefore, to minimize the gap, two kinds of efforts are needed. It is necessary to include the educational knowledge of field experts for Military School Education content. The other needed effort is to enlarge self-education. A standard book on supply management below the Organization Level should be published. Even if someone has no knowledge of supply they can complete field supply tasks by referencing the book.

*Solution #3 Improving the lack of refresher education*

Finally, the third solution is to develop an Integrated On-line E-learning System (IOES) to improve the lack of Refresher Education. In order to succeed and survive in new business environment, individuals and organizations must continually obtain new skills and new ways of managing knowledge and information (Coleman & Laplace, 2002). According to Zhang and Nunamaker (2003), today's new economy has several characteristics: industrial change, globalization, increased intensive competition, information sharing & communication, and information technology revolution. Therefore, traditional classroom education (or training) does not always satisfy all the requirements of the new world of lifelong learning.

With regard to IOES, relevant information is addressed from documents related to E-learning. According to Eklund et al. (2003), E-learning is "a wide set of applications and processes, which use all available electronic media to deliver vocational education and training. It includes computer-based learning, web-based learning, virtual classrooms and digital collaboration". To make professional learning more flexible for clients, E-learning is used by a broad range of electronic media (Internet, intranets, extranets, satellite broadcast, audio/video tape, interactive TV and CD-ROM). E-learning shortens the time required to update workers on new products, methods, and processes. With state-of-the-art E-learning management systems, online education is more efficient, faster, and cheaper than traditional classroom education. Online or web-based learning (learning via the Internet, intranets and extranets) is more and more understood to be a subset of e-learning and becoming an integral part of organizational training. (Eklund et al., 2003)

IOES focuses on web-based technologies by using the Intranet. As mentioned in Area#1, a web-based system has many benefits. According to KPMG (2002), a web-

based system can provide simple publicly accessible web-pages to complex online

delivery platforms. These platforms manage student access to content, group interaction,

online assessment and ancillary functions such as enrollments and student records.

Therefore, developing of IOES can fill the gap of refresher education. One limitation of

IOES is that it cannot provide education service for personnel at off-line units. In that

case, CDs with educational content can be distributed.

Table 22 shows the summary of solutions related to Area #5 Education and

training.

Table 22 Summary of Solutions related to Area #5

| Solutions | Summary |
|---|---|
| Providing a self-education environment | - Publish and Provide the standard book like Field Manuel<br>- Ensure the time to self-study and test the performance |
| Minimizing the gap | - Reflect the educational knowledge of field experts for Military School Education content<br>- Enlarge and accomplish effectively self-education |
| Improving the lack of refresher education | - Develop Integrated On-line E-learning System (IOES)<br>- IOES focuses on web-based technologies by using intranet<br>- Use CDs for personnel at off-line Unit Level |

### Area #6 Personnel (Manpower)

The Personnel area is strongly related to other areas: Supply Computer System,

Information Sharing, Policy/Regulation, Education/Training, because personnel are the

main body to accomplish supply management. The focus of this area involves how well

personnel with requisition tasks are managed below the Organization Level. The causes

related to personnel problem which create requisition problems are described, along with

suggested solutions, according to interviews and relevant documents.

Before describing causes, the positions and responsibilities of all supply

management personnel at the Unit Level and the Organization Level are shown as Table

23.

Table 23 Positions and Responsibilities of all members related to supply work

| Position | Responsibilities related with supply |
|----------|--------------------------------------|
| Unit Commander | - Responsible for the proper use, care, custody, and safekeeping of all property within the Unit.<br>- Ensures that unit property is serviceable.<br>- Ensures supply personnel are properly trained.<br>- Responsible for supervising ASS and Supply soldier activity |
| UMM | - Responsible for submission of routine SDI report.<br>- Prepares and maintains supply and property book records.<br>- Safeguards supplies and property stored in unit supply room and storage areas.<br>- Request, reception, and issuing supplies.<br>- Prepares adjustment documents for lost, damaged, or destroyed property.<br>- Ensures excess property is turned in. Begins process to account for lost, damaged, or destroyed property. |
| Unit Supply soldier | - Responsible for assistance with ASS |
| Organization Commander | - Responsible for the proper use, care, custody, and safekeeping of all property within the Organization.<br>- Ensures that unit property is serviceable.<br>- Ensures supply personnel are properly trained.<br>- Responsible for supervising S4 and Supply Sergeant activity |
| Organization S4 or Supply Sergeant | - Advises other staff officers and commanders on supply matters.<br>- Monitors the requisition, temporary storage, and distribution<br>- Responsible for collecting of routine SDI report and requisition.<br>- Prepares and maintains supply and property book records.<br>- Request, reception, and issuing supplies. |
| Organization Supply soldier | - Responsible for assistance with S4 or Supply Sergeant |

(Adapted from Korean AR, 2007)

In the above table, the supply soldier is only responsible for assisting the UMM or S4 (supply sergeant); however, he accomplishes most of the supply tasks.

**The causes leading to requisition problems**

*Cause #1 Overburden of mission*

The first cause related to personnel is the overburden of UMMs and Supply soldiers at the Unit Level with regard to mission. They have a lot of missions to complete in a day. For example, the UMM should manage all administrative tasks within the Unit and the supply soldier should attend the training class for combat skills instead of supply management. The excessive work is also related to the lack of Supply Computer System, the lack of Information Sharing, the lack of Education, etc…, as mentioned in other sections. A supply soldier at the Unit Level is responsible for managing all materials within the Unit: recording property book, preparing for SDI report, receiving/issuing of supplies, etc...

*Cause #2 Routine and monotonous work*

The second cause is that UMMs, supply soldiers, and supply sergeants view submitting requisitions as routine, monotonous task without any effort to improve the system. The current work environment does not motivate them to improve job performance. For example, in regard to personnel at the Unit Level, they do not follow up if there is no response to requisitions after submitting a SDI report. In regard to personnel at the Organization Level, they do not make any efforts to improve the requisition processes, especially in regard to SDI report management. The reason is that there is no adequate compensation for their efforts and there is no punishment for inaccuracy, except for future problems, such as lost of combat equipment.

*Cause #3 Distrust between personnel*

The third cause is the lack of credibility between personnel at different Unit Levels. The personnel at the Unit Level do not trust the personnel at the Organization Level with regard to receiving requested supplies in a timely manner, and the personnel at the Organization Level also do not trust the personnel at the Unit Level with regard to the accuracy of a SDI report. The credibility gap exists between personnel at the Organization Level and the personnel at the Support Unit Level with regard to the accuracy of a requisition also.

Table 24 shows the summary of causes related to Area #6 Personnel (Manpower)

Table 24 Summary of Causes related to Area #6

| Causes | Summary |
|---|---|
| Overburden of mission | - There are a lot of missions to complete in a day<br>- Overworks due to manual tasks |
| Job completion as a monotonous routine | - There is no effort for improvement of requisition process<br>- Current work environment does not motivate to improve job performance<br>- There is no adequate compensation or penalty |
| Distrust between personnel | - Between the personnel at the Unit Level and the personnel at Organization Level<br>- Between the personnel at the Organization Level and the personnel at Support Unit Level<br>* Due to the inaccuracy of work performance |

**The solutions to improve requisition problems**

To mitigate the requisition problems with regard to personnel, three solutions are suggested on the basis of relevant documents. As previously mentioned, the personnel area is strongly related to other areas; therefore, most of the problems with personnel can

be mitigated by solutions suggested in other areas. Due to that, the suggested solutions are described in relation to the solutions previously mentioned.

*Solution #1 Lightening tasks*

The first solution is to lighten the tasks of UMMs and Supply soldiers at the Unit Level. The overburdening tasks given to personnel can be lessened by the following.

- Developing user-friendly computer system such as WISS (Using REMPO)

- Enhancing ISC with the personnel at higher Unit Level by EBB and KASKISE

- Correcting logistics policy and army regulation related to SDI

- Publishing standard book for supply tasks and providing self-education opportunity by IOES

UMMs tasks should be analyzed and the responsibility of each task should be cleared with the unit commander. The tasks to be accomplished in a day should be assigned by mission priority and a standard procedure should be established. To improve the Supply soldier's work environment, the training of supply soldiers should be focused on supply management capability as well as combat skills. The supply soldier's mission is to support Combat Soldiers for success of combat missions. Additionally, the supply soldier's tasks also should be standardized, according to the UMM's tasks, to prevent redundancy.

*Solution #2 Developing motivational method*

The second solution is to develop motivational methods for personnel below the Organization Level, in order to improve their job performance. According to organizational behavior experts, motivation can be defined in a number of ways. In this research, it is defined as an energetic force that drives personnel below the Organization

Level to manage supplies effectively in order to achieve combat readiness of the Unit and the Organization. With regard to employee's motivation, there are numerous theories and studies in society because motivation is the key to performance improvement. A brief look at four relevant motivation theories is addressed as follows. (Shah, 2008)

- Contribution of Robert Owen: People are similar to machines. A machine that is looked after properly, cared for and maintained well, performs efficiently, similarly people are likely to be more efficient if they are taken care of.

- Jeremy Bentham's "The Carrot and the Stick Approach": All people are self-interested and are motivated by the need to avoid pain and find satisfaction. Any worker will work only if the reward is big enough, or the punishment sufficiently unpleasant.

- Vroom's Valence x Expectancy theory: The strength of a tendency to act in a specific way depends on the strength of an expectation. The act will be followed by a given outcome and on the attractiveness of that outcome to the individual. An employee can be motivated to perform better when there is a belief that better performance will lead to a good appraisal and that this will result in the realization of a personal goal in the form of some reward.

- B.F. Skinner's Reinforcement Theory: By designing the environment properly, individuals can be motivated. Instead of considering internal factors like impressions, feelings, attitudes and other cognitive behavior, individuals are directed by what happens in the environment external to them. Hence, the only way to motivate is to keep on making positive changes in the external environment of the organization.

According to B.F. Skinner's theory, to reinforce the personnel below the Organization Level, positive changes in the external environment are needed. For this, some solutions were already mentioned: WISS, Enhancing ISC with EBB/KASKISE, IOES, and etc... With regard to other motivation theories, the key to improve job performance is that personnel should be taken care of and personnel are strongly motivated by adequate rewards and punishments. Therefore, it is necessary to reinforce sufficient reward and penalty for personnel to improve their job performance. For example, personnel at the Unit Level should be evaluated periodically for improving requisition problems related to SDI. On the basis of the evaluation, sufficient compensation and punishment should be provided. Reinforcement should focus on positive things, such as military medals, awards, decorations, and etc...

*Solution #3 Improving credibility gap*

The third solution is the improvement of the credibility between personnel. The trust related to the job is based on the accuracy of supply management- particularly the accuracy of SDI activities. Therefore, if the suggested solutions previously mentioned are realized, naturally it results in the recovering of trust between the personnel at the Unit Level, the personnel at the Organization Level, and the personnel at the Supporting Unit Level. Table **25** shows the summary of causes related to Area #6 Personnel (Manpower)

Table 25 Summary of solutions related to Area #6

| Solutions | Summary |
|---|---|
| Lightening tasks | - Improving work environment: WISS, Enhancing ISC with EBB/KASKISE, IOES, etc…<br>- Tasks should be reanalyzed and the responsibility of tasks should be cleared<br>- Improving Supply soldier's work environment; training and standardized task procedure |

| Developing motivational methods | - Positive changes in the external environment are needed<br>- Reinforcing sufficient reward and penalty for personnel |
|---|---|
| Improving the credibility gap | - Improving the accuracy of supply management performance by suggested solutions previously mentioned |

### *Area #7 Other Areas*

This section describes other causes and solutions which are not included in the previous six areas. Most causes and solutions related to requisition problems were described in previous sections in detail. However, it is necessary to describe two more causes because these also have influence on not only total supply chain management but also the requisition process.

#### *Cause #1 Lack of commanders' concerns*

The first cause which leads to problems in the KASC is the lack of commanders' concern about supply management at the Unit / Organization Level. There is a tendency for the commander of the Combat Unit does to not regard supply management as an important military mission. For example, the commanders recognize combat training as a critical military mission which they must supervise, control, and accomplish every day. However, supply specialty training or material management is not regarded as a crucial mission. The commander's military job focus is very important because the members under the control of the commander have a tendency to concentrate on their commander's concern.

#### *Cause #2 Supplier-focused supply management*

The second cause is that the Korean Army Supply Chain Management (KASCM) is conducted with the focus on the supplier instead of customer. Current supply

management in the Korean Army focuses on the Supporting Unit Level supply activity instead of Organization/Unit Level supply activity. For example, the performance measurements relating to supply activity are analyzed at the Supporting Unit Level and are only shared between Supporting Units. The end-user in the KASC does not know about the performance measurement results. As a result, the supply management between the Unit Level and the Organization Level is not focused and not developed.

With regard to the causes mentioned in this section, solutions are not suggested because the causes are generally recognized and there is a mood for improving the problems. Instead of new suggestions, the solutions mentioned in other sections will play an important role in improving the whole requisition process in the Organizational Supply of the KASC.

**Summary**

To achieve the purpose of this research, this chapter provided the research findings based on the data collected by interviews and in-depth study of relevant documents. The findings were analyzed in detail, focusing on the seven key areas ranked by importance and priority from the view of field experts. In the research findings there were twenty causes leading to the requisition problems related to the seven areas and sixteen practical solutions were suggested for the problems with the requisition process. The causes were analyzed from the data collected by interviews and the solutions were suggested on the basis of relevant documents. The next chapter provides the conclusions of this research.

## V.    Conclusion

**Overview**

      This chapter summarizes the overall research effort and presents conclusions. It briefly addresses the research findings, including research purpose and research

questions. In addition, it discusses the research limitations and recommendations. Finally, some suggestions for future research are presented.

**Research findings (Contributions)**

As stated earlier, this research is an important first step of in-depth research about Organizational Supply in the KASC. This study began with the concern that "Organizations/units' supply activities are fundamental for overall Korean Army Supply Chain Management".

The purpose of this research is to suggest practical solutions for requisition problems: long CWT, long RPT, and high RER, with Class II Supplies in Organizational Supply. The timely flow of supplies is critical to ensure combat readiness and maximize combat power. However, both the long RPT and the high RER in Organizational Supply have been preventing the timely flow of supplies.

For this research, the two basic approaches of "cause and effect" and "problem and solution" were used. Once the causes are identified, solutions for requisition problems are suggested. To achieve the aim of the research, the following overall research questions were answered, (1) "What are the causes which lead to requisition problems in Organizational Supply?" (2) "How can the requisition problems be solved in Organizational Supply?" The five investigative questions that accompanied the overall research questions were studied and answered as follows.

1. *What is the requisition process in the Organizational Supply?*

The requisition can be defined as a supported unit's authoritative demand or request for supplies needed to the next higher supporting unit. The requisition is one of

the key functions in the Korean Army supply management: Requisition, Receipt, Issue, Store, and Disposition (or Turn-in). A requisition flows from units to the next higher supporting unit, as shown in **Figure 17**. Submitting a requisition is a critical task to request the supplies needed to the next higher source of supply. In order to manage Class II Supplies, two supply management computer programs are currently used in the KASC: ULPBCMP for units and DMSS for organizations and supporting units.
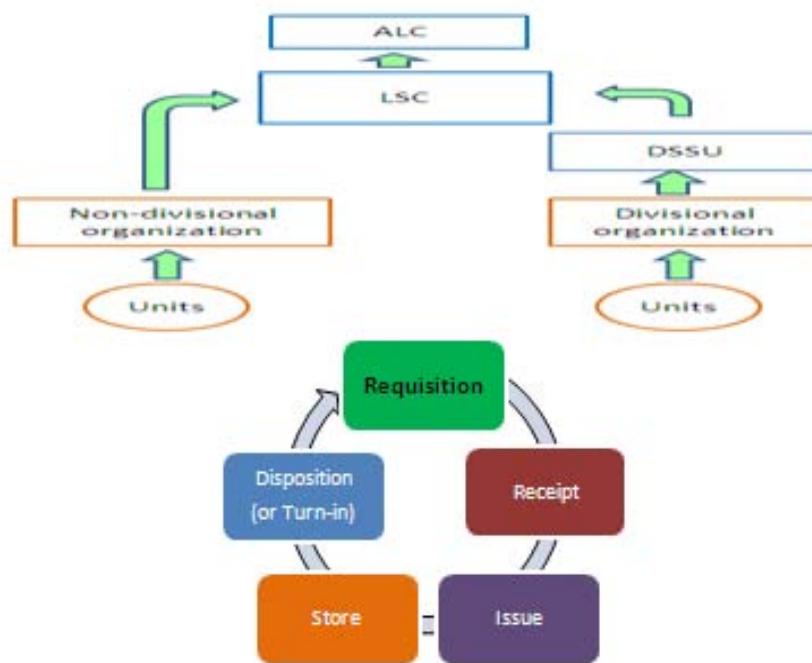
Figure 17 Requisition process in the Organizational Supply

2. *What are the key steps of the requisition process in the Organizational Supply?*

At the Unit Level, a UMM creates a SDI report weekly according to the SDI and submits the report to an organizational unit as a requisition document. The SDI is the unit's indispensable supply activity for maintaining combat readiness and for calculating a real supply quantity required. The SDI is performed on-duty time or off-duty time

during work-days, and it involves the real counting of an inspection item's quantity and differentiating an inspection's condition by four condition codes: A, B, C, and D. At the Organization Level, a S4 or OSS of an organization receives a SDI report from a unit, examines the accuracy of the requisitions, and inputs the data of the SDI reports into the DMSS. After inputting the SDI report of each unit, the OSS (or S4) creates a total requisition of each item in the DMSS and the requisition is transferred to the next higher supporting unit. **Figure 18** provides a brief overview with the key steps of a requisition in the KASC.
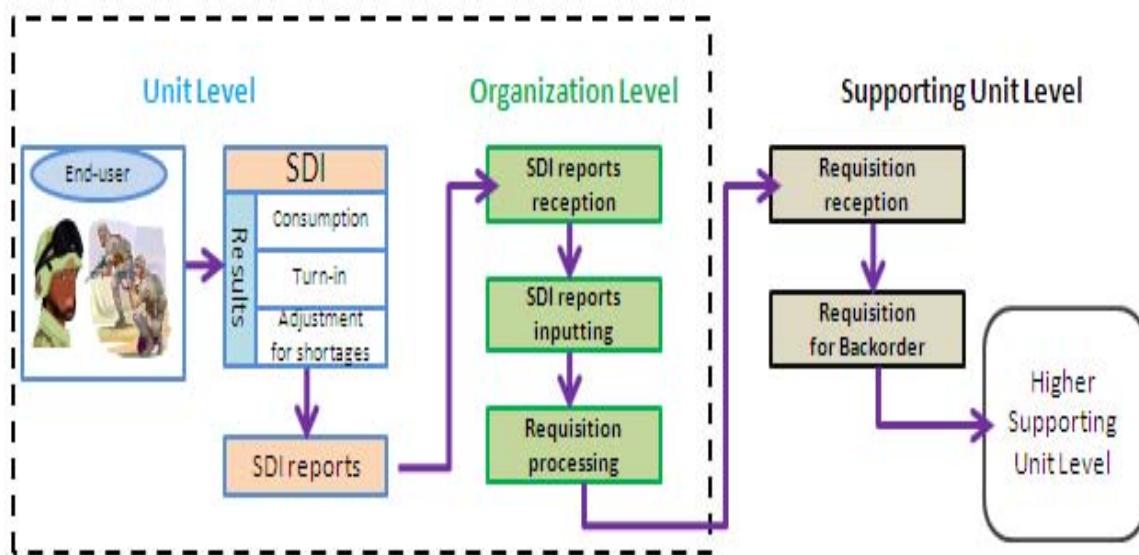


Figure 18 Key steps of the requisition process in the Organizational Supply

3. *What key areas have influence on the requisition process in the Organizational Supply?*

The key areas influencing the requisition process in Organizational Supply gave a direction to identify the causes leading to the requisition problems and the solutions to mitigate the problems. Based on the key areas, interview questions were established and

the data needed were collected by interviews and documents. Also, data analysis was accomplished in-depth by focusing on the key areas. To identify the key areas, relevant literature was reviewed in detail. The results were summarized as shown in Table 7 **Findings from the literature review**, in Chapter 2. According to the results, the seven key areas of influence on the requisition process in Organizational Supply were identified as follows.

     i.     Information Sharing and Communication

    ii.     Computer System and Technology

   iii.     Personnel (Manpower)

   iv.     Education and Training

    v.     Logistics Policy (focus on SDI)

   vi.     Performance measurement

  vii.     Other areas

In order to determine what area is more important and should be improved promptly, the seven key areas were ranked by importance and priority, according to the interviews, as shown in Table 11. The ranked seven areas indicate what area is more important and should be improved quickly from the view of the field experts. Therefore, data analysis was conducted according to the ranked seven key areas, and the priority area was more extensively studied than other areas.

    **4.**   ***With regard to the key areas, what are the causes leading to the requisition problems in the Organizational Supply?***

In order to answer this investigative question, a case study methodology was used with levels; one level was the requisition process of two divisional organizations and the

other level was the requisition process of two non-divisional organizations. For data

collection, interviews with field experts at four different organizations and its supporting

units were conducted by e-mail and phone. According to the results of interviews, the

causes leading to requisition problems were identified as shown in **Table 26**.

Table 26 Summary of the causes leading to the requisition problems

| Seven key Areas ranked | The causes |
|---|---|
| 1.Computer system and Technology | • Inefficient ULPBCMP <br> • Lack of DMSS function for Organizational Supply <br> • Disconnected network |
| 2. Information sharing and Communication | • Delayed Feedback for SDI report <br> • Lack of information providing <br> • Lack of ISC tools |
| 3. Logistics policy (focusing on SDI) | • Lack of criteria for SDI item classification <br> • Lack of regulation about SDI planning and execution <br> • Lack of regulation about SDI reporting |
| 4. Performance measurement | • SPMIs focused on Supporting Unit <br> • Lack of various SPMIs <br> • Lack of feedback of SPMIs |
| 5. Education and Training | • Lack of education environment <br> • Gap between education and actual execution <br> • Lack of refresher education |
| 6. Personnel (Manpower) | • Overburdening of mission <br> • Job completion as a monotonous routine <br> • Incredibility between personnel |
| 7. Other areas | • Lack of commander's concerns <br> • Environment focusing on supplier not customer |

5. ***With regard to the key areas, what are the solutions for the requisition***

   ***problems in the Organizational Supply?***

In order to answer this investigative question, the same methodology was applied.

However, the data collected from the interviews were not enough to suggest the solutions

for the requisition problems. Therefore, data was also collected from relevant document

sources: Korean DoD regulations, Korean Army / U.S. Army regulations, Korean Army

Field Manuals (FMs) / U.S. Army FMs, Military publications, journal articles, and other

internet resources. Using the data collected from the documents, the researcher delved

into practical solutions in order to improve the requisition problems in Organizational

Supply. **Table 27** provides a summary of the solutions to improve the requisition

problems.

Table 27 Summary of solutions to improve the requisition problem**s**

| Seven key Areas ranked | The solutions |
|---|---|
| 1.Computer system and Technology | • Developing WISS<br>• Upgrading DMSS<br>• Reducing data transferring time<br>• Using EBB and REMPO |
| 2. Information sharing and Communication | • Standardizing feedback procedure<br>• Improving ISC<br>• Developing communication tools |
| 3. Logistics policy (focusing on SDI) | • Reclassifying SDI items<br>• Improving the environment with planning and execution<br>• Improving SDI reporting procedure |
| 4. Performance measurement | • Developing new metrics (new SPMIs) |
| 5. Education and Training | • Providing a self-education environment<br>• Minimizing the gap<br>• Improving the lack of Refresher Education |
| 6. Personnel (Manpower) | • Lightening tasks<br>• Developing motivational methods<br>• Improving credibility |
| 7. Other areas | • All solutions previously mentioned |

### *Key contributions of this research*

This research provides seventeen practical solutions to improve the persistent

requisition problems with Class II Supplies in Organizational Supply in the KASC. The

results of this study will be provided to the Korean Army Logistics Department for

improving the requisition process in Organizational Supply. This research is expected to make contributions for the development of logistics as follows.

- This research is an initiative to delve into the problems with Organizational Supply in the KASC. It is guidance for further research on Organizational Supply.

- This research provided seventeen detailed practical solutions rather than conceptual suggestions for the requisition problems in the Organizational Supply in detail.

- This research provided a useful framework to solve the problems with other Classes of supplies: Class I, Class III, Class IV, Class VIII, and Class IX.

- This research also provided a useful framework to solve the problems of other key processes in the KASC: distribution process, transportation process, inventory management process, turn-in process, etc...

- Finally, this research provides guidance for other military organizations facing similar problems, such as the Korean Air Force and Navy requisition problems.

## Recommendations

It is recommended that the seventeen practical solutions be applied to the Organizational field units as soon as possible. The seven key areas were ranked by importance and priority, from the view of field experts. The seventeen solutions can be differentiated by several criteria as follows.

- Costs means whether the execution of each solution requires cost or not. (Yes or No)

- Time shows if the application of each solution is possible immediately ( ☻ ), in short term (in six months; ▲), or in long term (over six months; ▼).

- Expert's aid means whether the application of each solution requires expert's helps or not: particularly information system experts. ( Yes or No)

**Table 28** provides the seventeen solutions differentiated by above criteria.

Table 28 Seventeen solutions differentiated by several criteria

| The solutions | Cost | Time | Expert's aid |
|---|---|---|---|
| Developing WISS | Yes | ▼ | Yes |
| Upgrading DMSS | Yes | ▼ | Yes |
| **Using EBB and REMPO** | No | ☺ | No |
| **Reducing data transferring time** | No | ☺ | No |
| **Standardizing feedback procedure** | No | ☺ | No |
| **Improving ISC** | No | ☺ | No |
| Developing communication tools | Yes | ▼ | Yes |
| **Reclassifying SDI items** | No | ☺ | No |
| **Improving the environment with planning and execution** | No | ☺ | No |
| **Improving SDI reporting procedure** | No | ☺ | No |
| **Developing new metrics (new SPMIs)** | No | ☺ | No |
| Providing a self-education environment | No | ▲ | No |
| Minimizing the gap | No | ▲ | No |
| Improving the lack of Refresher Education | Yes | ▼ | Yes |
| Lightening tasks | No | ▲ | No |
| **Developing motivational methods** | No | ☺ | No |
| Improving the credibility gap | No | ▼ | No |

According to the above Table, it is strongly recommended that leaders enact the solutions that can be executed immediately without cost and expert's aid: Using EBB and REMPO, Reducing data transferring time, Standardizing feedback procedure, Improving ISC, Reclassifying SDI items, Improving the environment with planning and execution, Improving SDI reporting procedure, Developing new metrics (new SPMIs), and

Developing motivational methods. In addition, the solutions in priority ranked Areas, especially the solutions related to information technology such as developing WISS and upgrading DMSS, should be developed and executed as soon as possible. The solutions require coordination between the information technology department and logistics departments, in the Korean Army.

**Limitations**

The research was limited by several elements: the scope of this research, interviews by phone and e-mail, and the researcher's bias. This section addresses each of these concerns:

First, the scope of this research was to identify the causes and solutions for the requisition problems in the Organizational Supply in the KASC. Due to the small differences of requisition process between Supply Classes, the research was limited to the requisition process of Class II Supplies, in the Organizational Supply. Additionally, due to time restrictions, the research was limited to the evaluation of four organizations.

Second, all interviews were accomplished by e-mail and phone due to the geographic restriction. Although the interviewees were extremely knowledgeable on the requisition process in the Organizational Supply, the information gathered from the interviews did not provide in-detail solutions for the requisition problems. The researcher used available documentation to suggest practical solutions for each cause leading to requisition problems.

Finally, this research was limited due to researcher's bias. In qualitative research, the researcher is referred to as an instrument (Yin, 2003; Leedy and Ormrod, 2001:162).

According to Creswell (1994), the researcher should identify "personal values, assumptions and biases at the outset of the study", because the interpretation of data is vulnerable to researcher bias. (Creswell, 1994:163) The researcher's perception is based on several years of experience could not be considered all encompassing when establishing a baseline for the practical solutions suggested.

**Future research**

There are opportunities for several further researches that may enhance the value of these initial findings and identify additional benefits of the practical solutions suggested. First, future research could be focused on each area of the seven key areas ranked. The rank of the seven key areas shows what area is more important and should be improved quickly from the view of the field experts. Therefore, in-depth research on each area will give more insight. Second, if the research is conducted by the Korean Army Headquarters, the data could be collected from various organizations and interviewees in the field. Finally, quantitative research could be conducted to examine the effect of the solutions suggested previously. For example, the execution of solutions suggested could be analyzed for their impact on the CWT.

**Appendix A. Abbreviation & Acronyms**

ACWT Average Customer Wait Time
ADD   Average Daily Demand
AKO   Army Knowledge Online
ALC   Army Logistics Command
AQ    Authorized Quantity

ARR    Authorization and Retaining Rate

ASL    Authorized Stockage List

BPC    Budget Project Code

CC    Condition Code

CDC    Central Data Center

CRQ    Current Retention Quantity

CWT    Customer Wait Time

DAPA Defense Acquisition Program Administration

DAR    Demand Accommodation Rate

DI    Due-in stock

DMSS Defense Materiel Supply System

DN    Document Number

DO    Due-out stock

DOS    Days of Supply

DS    Direct Support

DSSU Divisional Supply Supporting Unit

EBB    Electronic Bulletin Board

ECR    Efficient Consumer Response

EFR    Efficient Foodservice Response

FM    Field Manual

GS    General Support

IBR    Inventory Backorder Rate

IOES    Integrated On-line E-learning System

IP    Inventory Position

ISC    Information Sharing and Communication

KASC Korean Army Supply Chain

KASCM        Korean Army Supply Chain Management

KASKISE        Korean Army Supply Knowledge Integrated Searching Engine

LSC    Logistics Supporting Command

MRD    Materiel Release Denial

MRO   Materiel Release Order

NIIN   National Item Identification Number

NSL   Non-authorized Stockage List

OC     Objective Code

OCT   Order Cycle Time

OFP   Order Fulfillment Process

OH     On-hand stock

OJT   On-the Job Training

OSS   Organizational Supply Sergeant

PBO   Property Book Officer

PBUSE     Property Book Unit Supply Enhanced

RDR   Requisition Denial Rate

REMPO Requisition Management Program for Organization Level

RER   Requisition Error Rate

RPT   Requisition Processing Time

RRT   Requisition Response Time

SAF   Swedish Armed Forces

SARSS     Standard Army Retail Supply System

SBMA Standard Book of Material Allowance

SCM   Supply Chain Management

SCM   Supply Chain Management

SDI   Supplies Daily Inspection

SMFM Supply Management Field Manual

S-NCO     Supply Noncommissioned Officer

SPBS   Standard Property Book System

SPMI   Supply Performance Measurement Indicator

SRR   Supply Release Rate

SSC   Self-service Supply Center

SSD   Supply Sustaining Days

SSR   Supply Support Rate

TIC     Transaction Identification Code

TOE     Table of Organization and Equipment

TPT     Transportation Processing Time

UARB    Unit Activity Record Book

UC      Unit of Consumption

UI      Unit of Issue

UIC     Unit Identification Code

ULLS    Unit Level Logistics System

ULPBCMP     Unit Level Property Book Computerized Managing Program

UMM     Unit Materiel Manager

USB     Universal Serial Bus

VM      Velocity Management

WISS    Web-based Integrated Supply System

## Appendix B. Interview Questions

## Interview Questions

**Disclaimer:** Hi, I am a Captain Mincheol Cho, grad student at the Air Force Institute of Technology. The following questions are to identify the causes longer Requisition Processing Time and higher Requisition Error Rate in Organizational Supply of the KASC, and to collect the methods for improving the flow of supplies. I think there is no

one who recognizes the real problem more than you know. Please answer questions on the basis of your experience and thought with regard to requisition process. I sincerely appreciate your participation in my data collection effort.


**Position Title_____ Rank_____ Name_____ Date_____**

**Questions**

- **Information Sharing and Communication**

1. Does the information sharing and communication system between supporting unit

   and supported unit working well?

   - If yes, explain how?

2. What information do you provide for organization unit? (e.g. current inventory)

   - How? And how often?

3. Do you provide the reason with delayed supply for organization unit?

4. Is there any system to collect the information of Organizational Supply activity?

   - If yes, what? How? How often?

5. Do you receive the question from organization or its unit? What are Frequently

   Asked Questions (FAQs)?

6. What information do you consider when you decide the quantity to be issued for

   the requisition?

7. What are other problems with the information sharing and communication

   existing in current situation?   How can be solved it in your opinion?


- **Computer system and technology**

1. What computer system do you use for supply management? Is it working well?

   - If not, explain what?

2. Is the handling of computer system for supply management easy?

   - If not, explain what specific function?

3. Is the computer system for supply management connected by on-line between organization (its units) and supporting unit?

4. What are other problems with the computer system and technology existing in current situation?  How can be solved it in your opinion?


- **Personnel (Manpower)**

1. Most of supply analysis points out the major problem with the requisition process due to the lack of concern of supply manager? Do you agree with that?

   - If yes, what is the lack of concern in detail? Why it happens? If no, why?

2. How many items are you responsible for supply? Is it appropriate for your ability? (considering the working time) - If not, how many items are enough?

3. What are other problems with the computer system and technology existing in current situation?  How can be solved it in your opinion?

- **Education and training**

1. How long have you been working in your position?

2. What education and training do you experience for your work? Is it enough for conducting your work? If no, what are needed?

3. Do you have any experience with training for the members in Organizational Supply?  If yes, how was the feedback?

4. What are other problems with the education and training existing in current situation?  How can be solved it in your opinion?

- **Logistics Policy (focus on SDI)**

1. What logistics policies do you rely on for the response of requisition? (list all as you know)

2. What are the problems and solutions with SDI policy in your thoughts and experience?

3. What are other problems with the logistics policy existing in current situation? How can be solved it in your opinion?


- **Performance measurement**

1. What kinds of methods are used to measure the supply performance with relate to requisition?

2. Do you have the credibility of current performance measurement? If not, why?

3. What is the performance measurement needed to measure real supply performance in your opinion?

4. What are other problems with the performance measurement existing in current situation?   How can be solved it in your opinion?


- **Other ares**

1. Describe any other problems on the basis of you experience.

2. What is the most important thing to be solved as soon as possible among various causes as described?

- **Ranking the seven key areas**

| Seven areas | Rank according to importance (Strong 7 --- weak 1) |
|---|---|
| Computer system and Technology | |
| Personnel (Manpower) | |
| Information sharing and Communication | |
| Logistics policy (focusing on SDI) | |
| Performance measurement | |
| Education and Training | |
| Other areas | |

Sincerely, I appreciate your response for many questions.

Captain Cho, Mincheol

**Appendix C. Requisition Management Program for Organization Level (REMPO)**

**Visual Basic Application (VBA) Code**

```
ThisWorkbook - 1
Option Explicit
Private Sub Workbook_Open()
Application.Visible = True
Application.DisplayAlerts = False
Inisrc.Show
End Sub
```

Inisrc - 1
Option Explicit
Private Const GWL_STYLE = -16
Private Const WS_CAPTION = &HC00000
Private Declare Function GetWindowLong Lib "user32" Alias "GetWindowLongA" ( _
ByVal hWnd As Long, _
ByVal nIndex As Long) As Long
Private Declare Function SetWindowLong Lib "user32" Alias "SetWindowLongA" ( _
ByVal hWnd As Long, _
ByVal nIndex As Long, _
ByVal dwNewLong As Long) As Long
Private Declare Function DrawMenuBar Lib "user32" ( _
ByVal hWnd As Long) As Long
Private Declare Function FindWindowA Lib "user32" ( _
ByVal lpClassName As String, _
ByVal lpWindowName As String) As Long
Private Declare Function SetWindowPos Lib "user32" ( _
ByVal hWnd As Long, _
ByVal hWndInsertAfter As Long, _
ByVal X As Long, _
ByVal Y As Long, _
ByVal cx As Long, _
ByVal cy As Long, _
ByVal wFlags As Long) As Long
Private Declare Function GetActiveWindow Lib "user32.dll" _
() As Long
Private Declare Function SendMessage Lib "user32" _
Alias "SendMessageA" _
(ByVal hWnd As Long, _
ByVal wMsg As Long, _
ByVal wParam As Long, _
lParam As Any) As Long
Private Declare Function GetSystemMenu Lib "user32" (ByVal hWnd As Long, ByVal
bRevert As Long) As Lon
g
Private Declare Function DeleteMenu Lib "user32" (ByVal hMenu As Long, ByVal
nPosition As Long, ByVal
wFlags As Long) As Long
Private Const SWP_NOMOVE = &H2
Private Const SWP_NOSIZE = &H1
Private Const GWL_EXSTYLE = (-20)
Private Const HWND_TOP = 0
Private Const SWP_NOACTIVATE = &H10
Private Const SWP_HIDEWINDOW = &H80
Private Const SWP_SHOWWINDOW = &H40

```vba
Private Const WS_EX_APPWINDOW = &H40000
Private Const WS_MINIMIZEBOX = &H20000
Private Const SWP_FRAMECHANGED = &H20
Private Const WM_SETICON = &H80
Private Const ICON_SMALL = 0&
Private Const ICON_BIG = 1&
Private Const HWND_NOTOPMOST = -2
Private Const HWND_TOPMOST = -1
Private Const SC_CLOSE As Long = &HF060
Const Es As String = "Timely Supply!"
Private Sub Closing_Click()
Me.Hide
Unload Me
End Sub
Private Sub Starting_Click()
Application.DisplayAlerts = False
Dim yeonwoo
Set yeonwoo = CreateObject("Scripting.FileSystemObject")
If (yeonwoo.FileExists("L:\ens students\09 STUDENTS AND THESIS\MASTERS
STUDENTS\GLM\CHO\SDIfeedbacks.x
ls")) Then
Reqm.Show
Else
MsgBox "Can't find a SDIfeedbacks.xls" & vbCr & "It is a necessary file to activate this
program." & v
bCr & "Ask to Program manager!", , "The Korean Army"
End If
End Sub
Private Sub UserForm_QueryClose(Cancel As Integer, CloseMode As Integer)
If CloseMode = 0 Then
Inisrc - 2
MsgBox "Press End Button!", vbExclamation, Es
Cancel = 1
End If
End Sub
Private Sub UserForm_Terminate()
Application.DisplayAlerts = False
Application.Visible = True
Application.Quit
End Sub
Private Sub AddMinimiseButton()
Dim hWnd As Long, hMenu As Long
hWnd = FindWindowA(vbNullString, Me.Caption)
Call SetWindowLong(hWnd, GWL_STYLE, _
GetWindowLong(hWnd, GWL_STYLE) Or _
```

```
WS_MINIMIZEBOX)
End Sub
Private Sub AppTasklist()
Dim WStyle As Long
Dim Result As Long
Dim hWnd As Long
hWnd = FindWindowA(vbNullString, Me.Caption)
WStyle = GetWindowLong(hWnd, GWL_EXSTYLE)
WStyle = WStyle Or WS_EX_APPWINDOW
Result = SetWindowPos(hWnd, HWND_TOP, 0, 0, 0, 0, _
SWP_NOMOVE Or _
SWP_NOSIZE Or _
SWP_NOACTIVATE Or _
SWP_HIDEWINDOW)
Result = SetWindowLong(hWnd, GWL_EXSTYLE, WStyle)
Result = SetWindowPos(hWnd, HWND_TOP, 0, 0, 0, 0, _
SWP_NOMOVE Or _
SWP_NOSIZE Or _
SWP_NOACTIVATE Or _
SWP_SHOWWINDOW)
End Sub
Private Sub UserForm_Activate()
AddMinimiseButton
AppTasklist
With Application
Me.Top = .Top
Me.Left = .Left
Me.Height = .Height
Me.Width = .Width
End With
End Sub
jochiscreen - 1
Private Sub UserForm_Activate()
With Application
Me.Top = .Top
Me.Left = .Left
Me.Height = .Height
Me.Width = .Width
End With
End Sub
Private Sub UserForm_QueryClose(Cancel As Integer, CloseMode As Integer)
If CloseMode = 0 Then
MsgBox "Press End Button!", vbExclamation, Es
Cancel = 1
End If
```

```vb
End Sub
Private Sub asking_Click()
Windows("REMPO.xls").Activate
If EventControl = True Then Exit Sub
Set asd = Sheets("imsis").Range("jaryopyo")
selecpo = jochiscreen.asking.ListIndex + 1
With jochiscreen
.unit.Value = asd.Cells(selecpo, 2).Text
.name1.Value = asd.Cells(selecpo, 4).Text
.ea.Value = asd.Cells(selecpo, 5).Text
.un.Value = asd.Cells(selecpo, 6).Value
.gong.Value = asd.Cells(selecpo, 17).Text
.jang.Value = asd.Cells(selecpo, 7).Value
.inspec.Value = asd.Cells(selecpo, 8).Value
.chai.Value = asd.Cells(selecpo, 9).Value
.a1.Value = asd.Cells(selecpo, 10).Value
.b1.Value = asd.Cells(selecpo, 11).Value
.d1.Value = asd.Cells(selecpo, 12).Value
.q1.Value = asd.Cells(selecpo, 13).Value
.w2.Value = asd.Cells(selecpo, 14).Value
.e3.Value = asd.Cells(selecpo, 15).Value
.r4.Value = asd.Cells(selecpo, 16).Value
.confo.Value = asd.Cells(selecpo, 23).Value
.unt.Value = asd.Cells(selecpo, 18).Value
.jangt.Value = asd.Cells(selecpo, 19).Value
.aib.Value = asd.Cells(selecpo, 20).Value
.cee.Value = asd.Cells(selecpo, 21).Value
.dee.Value = asd.Cells(selecpo, 22).Value
.duet.Value = asd.Cells(selecpo, 13).Value
.ban.Value = asd.Cells(selecpo, 14).Value
.somo.Value = asd.Cells(selecpo, 15).Value
End With
End Sub
Private Sub Inputting_Click()
Set input1 = Sheets("imsis").Range("a:aa")
input2 = jochiscreen.asking.ListIndex + 1
With jochiscreen
input1.Cells(input2, 23).Value = .duet.Value
input1.Cells(input2, 24).Value = .ban.Value
input1.Cells(input2, 25).Value = .somo.Value
input1.Cells(input2, 27).Value = .bigo.Value
input1.Cells(input2, 26).Value = .gigag.Value
End With
inpujiugi
MsgBox "Next item!", , "The Korean Army"
```

```
End Sub
Function inpujiugi()
With jochiscreen
.duet.Value = Empty
.ban.Value = Empty
.somo.Value = Empty
.bigo.Value = Empty
.gigag.Value = Empty
End With
End Function
Private Sub Confirming_Click()
Application.DisplayAlerts = False
jochiscreen - 2
Windows("REMPO.xls").Activate
Set bumwee = Sheets("imsis").Range("a1")
yongyec = bumwee.CurrentRegion.Rows.Count + 0
Z = "A1:" & "aa" & yongyec
Range(Z).Select
Selection.Copy
Workbooks.Open fileName:="L:\ens students\09 STUDENTS AND THESIS\MASTERS
STUDENTS\GLM\CHO\SDIfeedb
acks.xls"
Windows("SDIfeedbacks.xls").Activate
Set imsipyo = Sheets("Data").Range("a1")
chuga = imsipyo.CurrentRegion.Rows.Count + 1
Sheets("Data").Range("A" & chuga).Select
Selection.PasteSpecial Paste:=xlValues, Operation:=xlNone, SkipBlanks:= _
False, Transpose:=False
Sheets("Data").Range("A1").Select
ActiveWorkbook.Save
ActiveWorkbook.Close
Windows("REMPO.xls").Activate
Sheets("imsis").Range("A1").Select
Set bumwee1 = Worksheets("imsis").Range("a1")
yongyec1 = bumwee1.CurrentRegion.Rows.Count + 0
A = "a1:" & "b" & yongyec1
Sheets("imsis").Range(A).Select
Selection.Copy
Sheets("feedbacks").Select
Sheets("feedbacks").Range("a4").Select
Selection.PasteSpecial Paste:=xlValues, Operation:=xlNone, SkipBlanks:= _
False, Transpose:=False
Sheets("imsis").Select
Sheets("imsis").Range("A1").Select
Set bumwee2 = Worksheets("imsis").Range("a1")
```

```
yongyec2 = bumwee2.CurrentRegion.Rows.Count + 0
B = "d1:" & "e" & yongyec2
Sheets("imsis").Range(B).Select
Selection.Copy
Sheets("feedbacks").Select
Sheets("feedbacks").Range("c4").Select
Selection.PasteSpecial Paste:=xlValues, Operation:=xlNone, SkipBlanks:= _
False, Transpose:=False
Sheets("imsis").Select
Sheets("imsis").Range("A1").Select
Set bumwee3 = Worksheets("imsis").Range("a1")
yongyec3 = bumwee3.CurrentRegion.Rows.Count + 0
C = "r1:" & "aa" & yongyec3
Sheets("imsis").Range(C).Select
Selection.Copy
Sheets("feedbacks").Select
Sheets("feedbacks").Range("e4").Select
Selection.PasteSpecial Paste:=xlValues, Operation:=xlNone, SkipBlanks:= _
False, Transpose:=False
Sheets("feedbacks").Range("a1").Select
Sheets("feedbacks").Select
Sheets("feedbacks").Copy
pilename = InputBox("Input SDIreport feedback date, Year-Month-Date!" & vbCr &
"E.g. 20090326", "T
he Korean Army")
ActiveWorkbook.SaveAs fileName:="L:\ens students\09 STUDENTS AND
THESIS\MASTERS STUDENTS\GLM\CHO\"
& "SDI feedback" & pilename & ".xls", FileFormat:=xlNormal _
, Password:="", WriteResPassword:="", ReadOnlyRecommended:=False, _
CreateBackup:=False
ActiveWorkbook.Save
jochiscreen - 3
ActiveWorkbook.Close
Windows("REMPO.xls").Activate
MsgBox "All SDI reports' feedback was completed!" & vbCr & "Backup was
completed", , "The Korean A
rmy"
End Sub
Private Sub Endings_Click()
Application.DisplayAlerts = False
Windows("REMPO.xls").Activate
Sheets("feedbacks").Select
Set feedi = Sheets("feedbacks").Range("a1")
yeonwoo = feedi.CurrentRegion.Rows.Count + 0
k = "A4:" & "N" & yeonwoo
```

```
Range(k).Select
Selection.Delete
Sheets("imsis").Select
ActiveWindow.SelectedSheets.Delete
Sheets("SDIreports").Select
Set imsi = Sheets("SDIreports").Range("a1")
yongyec1 = imsi.CurrentRegion.Rows.Count + 0
k = "A2:" & "aa" & yongyec1
Range(k).Select
Selection.Delete
Sheets("initial").Select
Sheets("initial").Range("A1").Select
ActiveWorkbook.Save
Windows("DMSS.xls").Activate
ActiveWorkbook.Close
MsgBox "Timely Supply! Customer Satisfaction", , "The Korean Army"
jochiscreen.Hide
End Sub
Reqm - 1
Private Sub acknow_Click()
Ackn.Show
End Sub
Private Sub UserForm_Activate()
With Application
Me.Top = .Top
Me.Left = .Left
Me.Height = .Height
Me.Width = .Width
End With
End Sub
Private Sub UserForm_QueryClose(Cancel As Integer, CloseMode As Integer)
If CloseMode = 0 Then
MsgBox "Press End Button!", vbExclamation, Es
Cancel = 1
End If
End Sub
Private Sub searchi_Click()
Application.DisplayAlerts = False
Dim yeonwoo
Set yeonwoo = CreateObject("Scripting.FileSystemObject")
If (yeonwoo.FileExists("L:\ens students\09 STUDENTS AND THESIS\MASTERS
STUDENTS\GLM\CHO\SDIfeedbacks.x
ls")) Then
researc.Show
Else
```

```
MsgBox "Can't find a SDIfeedbacks.xls" & vbCr & "It is a necessary file to activate this
program." & v
bCr & "Ask to Program manager!", , "The Korean Army"
End If
End Sub
Private Sub colsdi_Click()
Dim obfie As Variant
Dim infie As Variant
Dim opfile As Workbook
Dim mgsource As Range
obfile = Application.GetOpenFilename(fileFilter:="Excels files(*.xls),*.xls",
Title:="Select all SDI r
eports to merge", MultiSelect:=True)
If TypeName(obfile) = "Boolean" Then Exit Sub
For Each infile In obfile
Set opfile = Workbooks.Open(infile)
opfile.Sheets("SDIreport").Rows("1:3").Select
Selection.Delete
opfile.Sheets("SDIreport").Range("p:p").SpecialCells(xlCellTypeBlanks).Select
Selection.EntireRow.Delete
opfile.Sheets("SDIreport").Range("A1").Select
Set bumwee = opfile.Worksheets("SDIreport").Range("a1")
yongyec = bumwee.CurrentRegion.Rows.Count + 0
Z = "A1:" & "p" & yongyec
opfile.Sheets("SDIreport").Range(Z).Select
Selection.Copy
Windows("REMPO.xls").Activate
Sheets("SDIreports").Select
Set imsipyo = Sheets("SDIreports").Range("a1")
chuga = imsipyo.CurrentRegion.Rows.Count + 1
Sheets("SDIreports").Range("A" & chuga).Select
ActiveSheet.Paste
Sheets("SDIreports").Range("A1").Select
opfile.Close savechanges:=False
Next infile
Windows("REMPO.xls").Activate
Sheets("SDIreports").Select
Set imsi = Sheets("SDIreports").Range("a1")
jengrel = imsi.CurrentRegion.Rows.Count + 0
k = "A2:" & "p" & jengrel
With ActiveWorkbook.Worksheets("SDIreports").Sort
.SetRange Range(k)
.Header = xlNo
.MatchCase = False
.Orientation = xlTopToBottom
```

```vba
.SortMethod = xlPinYin
Reqm - 2
End With
Sheets("SDIreports").Select
Sheets("SDIreports").Copy After:=Sheets("SDIreports")
Sheets("SDIreports (2)").Select
Sheets("SDIreports (2)").Name = "imsis"
MsgBox "All SDI reports were merged!", , "The Korean Army"
End Sub
Private Sub feedback_Click()
Dim fileName As String
Application.DisplayAlerts = False
Application.ScreenUpdating = False
Windows("REMPO.xls").Activate
Sheets("imsis").Range("q2").Select
ActiveCell.FormulaR1C1 = "=VLOOKUP(LEFT(RC[-1],10),info!C1:C2,2,0)"
Set bumwee = Sheets("imsis").Range("A1")
yongyec = bumwee.CurrentRegion.Rows.Count + 0
auto = "q2:" & "q" & yongyec
If yongyec > 2 Then
Selection.AutoFill Destination:=Range(auto)
Else
Range(auto).Select
End If
ActiveWorkbook.Save
Range(auto).Select
Selection.Copy
Range("Q2").Select
Selection.PasteSpecial Paste:=xlPasteValues, Operation:=xlNone, SkipBlanks _
:=False, Transpose:=False
Range("Q1").Select
Application.CutCopyMode = False
ActiveCell.FormulaR1C1 = "Unit Name"
Dim yeonwoo
Set yeonwoo = CreateObject("Scripting.FileSystemObject")
If (yeonwoo.FileExists("L:\ens students\09 STUDENTS AND THESIS\MASTERS
STUDENTS\GLM\CHO\DMSS.xls"))
Then
Workbooks.Open fileName:="L:\ens students\09 STUDENTS AND THESIS\MASTERS
STUDENTS\GLM\CHO\DMSS.xls"
Windows("DMSS.xls").Activate
Else
MsgBox "Can't find a DMSS.xls" & vbCr & "It is a necessary file to compare Unit's
property." & vbCr
& "Ask to Program manager!", , "The Korean Army"
```

```vba
End If
Windows("REMPO.xls").Activate
Sheets("imsis").Range("R2").Select
ActiveCell.FormulaR1C1 = _
"=VLOOKUP(RC[-1]&RC[-16],[DMSS.xls]DMSSasset!C1:C9,5,0)"
Sheets("imsis").Range("S2").Select
ActiveCell.FormulaR1C1 = _
"=VLOOKUP(RC[-2]&RC[-17],[DMSS.xls]DMSSasset!C1:C9,6,0)"
Sheets("imsis").Range("T2").Select
ActiveCell.FormulaR1C1 = _
"=VLOOKUP(RC[-3]&RC[-18],[DMSS.xls]DMSSasset!C1:C9,7,0)"
Sheets("imsis").Range("U2").Select
ActiveCell.FormulaR1C1 = _
"=VLOOKUP(RC[-4]&RC[-19],[DMSS.xls]DMSSasset!C1:C9,8,0)"
Sheets("imsis").Range("V2").Select
ActiveCell.FormulaR1C1 = _
"=VLOOKUP(RC[-5]&RC[-20],[DMSS.xls]DMSSasset!C1:C9,9,0)"
Sheets("imsis").Range("R2:V2").Select
Set bumwee = Sheets("imsis").Range("A1")
yongyec = bumwee.CurrentRegion.Rows.Count + 0
auto = "r2:" & "v" & yongyec
If yongyec > 2 Then
Selection.AutoFill Destination:=Range(auto)
Else
Range(auto).Select
End If
ActiveWorkbook.Save
Range(auto).Select
Selection.Copy
Range("r2").Select
Selection.PasteSpecial Paste:=xlPasteValues, Operation:=xlNone, SkipBlanks _
Reqm - 3
:=False, Transpose:=False
Columns("Q:V").Select
With Selection
.HorizontalAlignment = xlCenter
.VerticalAlignment = xlCenter
.WrapText = False
.Orientation = 0
.AddIndent = False
.IndentLevel = 0
.ReadingOrder = xlContext
.MergeCells = False
End With
Columns("P:Q").Select
```

```
Selection.Cut
Range("A1").Select
Selection.Insert Shift:=xlToRight
Range("a1").Select
Sheets("imsis").Rows("1:1").Select
Selection.Delete
Range("a1").Select
Set yiprec = Sheets("imsis").Range("a1")
yiprec.CurrentRegion.Name = "jaryopyo"
Sheets("imsis").Range("jaryopyo").Columns(1).Name = "ask"
jochiscreen.asking.RowSource = "ask"
jochiscreen.Show
End Sub
Private Sub CommandButton10_Click()
MsgBox "Timely Supply!", , "The Korean Army"
Reqm.Hide
End Sub
Private Sub CommandButton11_Click()
MsgBox "Timely Supply!", , "The Korean Army"
Reqm.Hide
End Sub
Private Sub CommandButton6_Click()
MsgBox "Timely Supply!", , "The Korean Army"
Reqm.Hide
End Sub
Private Sub CommandButton7_Click()
MsgBox "Timely Supply!", , "The Korean Army"
Reqm.Hide
End Sub
Private Sub CommandButton8_Click()
MsgBox "Timely Supply!", , "The Korean Army"
Reqm.Hide
End Sub
Private Sub CommandButton9_Click()
MsgBox "Timely Supply!", , "The Korean Army"
Reqm.Hide
End Sub
researc - 1
Private Sub chulrec_Click()
Application.DisplayAlerts = False
Messa = "Is printer abailable?"
Stal = vbYesNo + vbQuestion + vbDefaultButton1
taitl = "Confirm Printer"
RESPONSE = MsgBox(Messa, Stal, taitl)
If RESPONSE = vbNo Then Exit Sub
```

```
Range("daesang").Select
Selection.Copy
Windows("REMPO.xls").Activate
Sheets("chulrec").Select
Range("A3").Select
Selection.PasteSpecial Paste:=xlPasteValues, Operation:=xlNone, SkipBlanks _
:=False, Transpose:=False
Range("A3").Select
Rows("3:3").Select
Selection.Delete Shift:=xlUp
Range("A3").Select
ActiveWindow.SelectedSheets.PrintOut Copies:=1, Collate:=True
MsgBox "Printing is completed!", , "The Korean Army"
End Sub
Private Sub fromgigan_BeforeUpdate(ByVal Cancel As MSForms.ReturnBoolean)
yipval = researc.fromgigan.Value
If yipval = "" Then Exit Sub
If IsDate(yipval) = True Then
sengil = DateValue(yipval)
researc.gigan11.Value = Int((Int(Now) - sengil) / 365)
Else
MsgBox "Invalid Date Input!", , "The Korean Army"
Cancel = True
End If
End Sub
Private Sub togigan_BeforeUpdate(ByVal Cancel As MSForms.ReturnBoolean)
yipval2 = researc.togigan.Value
If yipval2 = "" Then Exit Sub
If IsDate(yipval2) = True Then
sengil2 = DateValue(yipval2)
researc.gigan22.Value = Int((Int(Now) - sengil2) / 365)
Else
MsgBox "Invalid Date Input!", , "The Korean Army"
Cancel = True
End If
End Sub
Private Sub johoi_Click()
Application.DisplayAlerts = False
Workbooks.Open fileName:="L:\ens students\09 STUDENTS AND THESIS\MASTERS
STUDENTS\GLM\CHO\SDIfeedback
s.xls"
Windows("SDIfeedbacks.xls").Activate
Range("AB2").Select
ActiveCell.FormulaR1C1 = "=MID(RC[-27],11,8)"
Range("AB2").Select
```

```
Set bumwee = Sheets("Data").Range("a1")
yongyec = bumwee.CurrentRegion.Rows.Count + 0
Z = "AB2:" & "AB" & yongyec
If yongyec > 2 Then
Selection.AutoFill Destination:=Range(Z)
Else
Range(Z).Select
End If
Range(Z).Select
Selection.Copy
Range("AB2").Select
Selection.PasteSpecial Paste:=xlPasteValues, Operation:=xlNone, SkipBlanks _
:=False, Transpose:=False
Application.CutCopyMode = False
Selection.TextToColumns Destination:=Range("AB2"), DataType:=xlDelimited, _
TextQualifier:=xlDoubleQuote, ConsecutiveDelimiter:=False, Tab:=True, _
Semicolon:=False, Comma:=False, Space:=False, Other:=False, FieldInfo _
:=Array(1, 5), TrailingMinusNumbers:=True
Range(Z).Select
Selection.Copy
researc - 2
Range("AC2").Select
Selection.PasteSpecial Paste:=xlPasteValues, Operation:=xlNone, SkipBlanks _
:=False, Transpose:=False
Range("AC2").Select
Range("jaryo").CurrentRegion.Name = "newjaryo"
Set yiprec = Sheets("Data").Range("newjaryo")
yiprec.CurrentRegion.Name = "newjaryo"
Windows("SDIfeedbacks.xls").Activate
Range("joganarea").ClearContents
With researc
jogan2 = .budae.Value
Range("jogans").Cells(2, 2).Value = "*" & jogan2 & "*"
jogan3 = .pumeng.Value
Range("jogans").Cells(2, 4).Value = "*" & jogan3 & "*"
jogan4 = .jepsu.Value
Range("jogans").Cells(2, 1).Value = jogan4
jogan5 = .niin.Value
Range("jogans").Cells(2, 3).Value = "*" & jogan5 & "*"
joganmen1 = .fromgigan.Value
If joganmen1 = "" Then
Range("jogans").Cells(2, 5).Value = ""
Else
jogan7 = ">=" & joganmen1
Range("jogans").Cells(2, 5).Value = jogan7
```

```
End If
joganmen11 = .togigan.Value
If joganmen11 = "" Then
Range("jogans").Cells(2, 6).Value = ""
Else
jogan8 = "<=" & joganmen11
Range("jogans").Cells(2, 6).Value = jogan8
End If
End With
Range("newjaryo").CurrentRegion.Name = "newjaryo"
Range("newjaryo").AdvancedFilter Action:=xlFilterCopy, _
CriteriaRange:=Range("jogans"), _
CopyToRange:=Range("daesang"), Unique:=False
Range("daesang").CurrentRegion.Name = "daesang"
researc.gumsec.RowSource = "daesang"
yipdel
Exit Sub
End Sub
Function yipdel()
With researc
.budae.Value = Empty
.jepsu.Value = Empty
.pumeng.Value = Empty
.niin.Value = Empty
.fromgigan.Value = Empty
.togigan.Value = Empty
End With
End Function
Private Sub jongryo_Click()
Windows("SDIfeedbacks.xls").Activate
ActiveWindow.Close
MsgBox "Timely Supply", , "The Korean Army"
researc.Hide
End Sub
```

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**14. ABSTRACT**

    Timely supply support is critical to sustaining military readiness and operations. In order to improve user satisfaction and to ensure supply support in a timely manner, the supply management paradigm is changing from supplier (supporting unit) focused management to customer (combat unit) focused management. This research focuses on improvements to the requisition process in Organizational Supply to reduce Customer Wait Time (CWT) in the Korean Army Supply Chain (KASC). The causes leading to requisition problems in seven key areas of Organizational Supply were examined, and seventeen solutions for the problems were suggested. Solutions that can be executed immediately without cost and expert's aid are emphasized. Solutions related to information technology, such as developing a Web based system, were strongly recommended. To reduce requisition processing time in the KASC, the Requisition Management Program was developed and suggested. It can be applied to current requisition tasks, and it would be a useful tool to reduce time and effort to manage requisitions in Organizational Supply.

**15. SUBJECT TERMS**
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